HAZARD RANKING SYSTEM DOCUMENTATION PACKAGE
SAN QERMAN GROUNDWATER CONTAMINATION
SAN GERMAN, PUERTO RICO

CERCLIS ID NO.: PRN000205957

VOLUME 1 of 2*

Contract No. EP-W-05-048
Work Assignment No. 052
Document Control No. SAT2.20113.052.284

October 2006

Prepared for:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Prepared by:
Region 2 Site Assessment Team 2
Weston Solutions, Inc.
Edison, NJ 08837

*(Original document was one volume. In order to fit this duplicate in binders it needed to be separated into two volumes.)

202861

HAZARD RANKING SYSTEM DOCUMENTATION PACKAGE
SAN GERMAN GROUNDWATER CONTAMINATION
SAN GERMAN, PUERTO RICO

CERCLIS ID NO.: PRN000205957

VOLUME 1 of 1

Contract No. EP-W-05-048
Work Assignment No. 052
Document Control No. SAT2.20113.052.284

October 2006

Prepared for:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Prepared by:
Region 2 Site Assessment Team 2
Weston Solutions, Inc.
Edison, NJ 08837

SECTION I: SITE NARRATIVE

Site Location/Size:

The San German Groundwater Contamination site (CERCLIS ID No. PRN000205957) consists of a ground water plume with no identified source(s) of contamination. The site is located in the municipality of San German, Puerto Rico. The size of the plume has not been determined as yet, but EPA is currently conducting work to better define the nature and extent of the contamination.

Site History:

The San German Urbano public water system consists of seven wells and two surface water intakes serving an estimated population of 25,000 people. Three of these wells (i.e., Retiro, Lola Rodriguez de Tio I, and Lola Rodriguez de Tio II) acted as an independent interconnected system with approximately 800 connections. Quarterly ground water samples collected by the system's operator, the Puerto Rico Aqueduct and Sewer Authority (PRASA), indicate that the chlorinated solvents tetrachloroethylene (PCE) and cis-1,2-dichloroethylene (cis-1,2-DCE) have been detected all three wells during the period 2001 to 2005. The maximum concentrations of PCE, and cis-1,2-DCE detected in these wells during this period were 6.4 micrograms per liter (ug/L) and 1.2 ug/L, respectively.

On 17 January 2006, the Puerto Rico Department of Health (PRDOH) ordered PRASA to close the Retiro well because of PCE concentrations exceeding the Maximum Contaminant Level (MCL) of 5 ug/L. The order indicated that in addition to being detected in the Retiro well, PCE was also detected in tap water samples collected from distributed water. PRASA responded to this order by taking the well out of operation on 19 January 2006; the pump was removed on 1 February 2006.

Ground water samples collected by EPA in June 2006 confirm the presence of PCE (1.6 ug/L) and cis-1,2-DCE (1.5 ug/L) in Lola Rodriguez de Tio I. Trichloroethylene (TCE) was also detected in this well at a concentration of 0.54 ug/L. Samples collected from background well El Real showed a non detect for PCE, cis-1,2-DCE, and TCE.

Site Contamination/Contaminants:

The contaminants of concern are tetrachloroethylene (PCE), trichloroethylene (TCE), and cis-1,2-dichloroethylene (cis-1,2-DCE).

Potential Impacts on Surrounding Community/Environment:

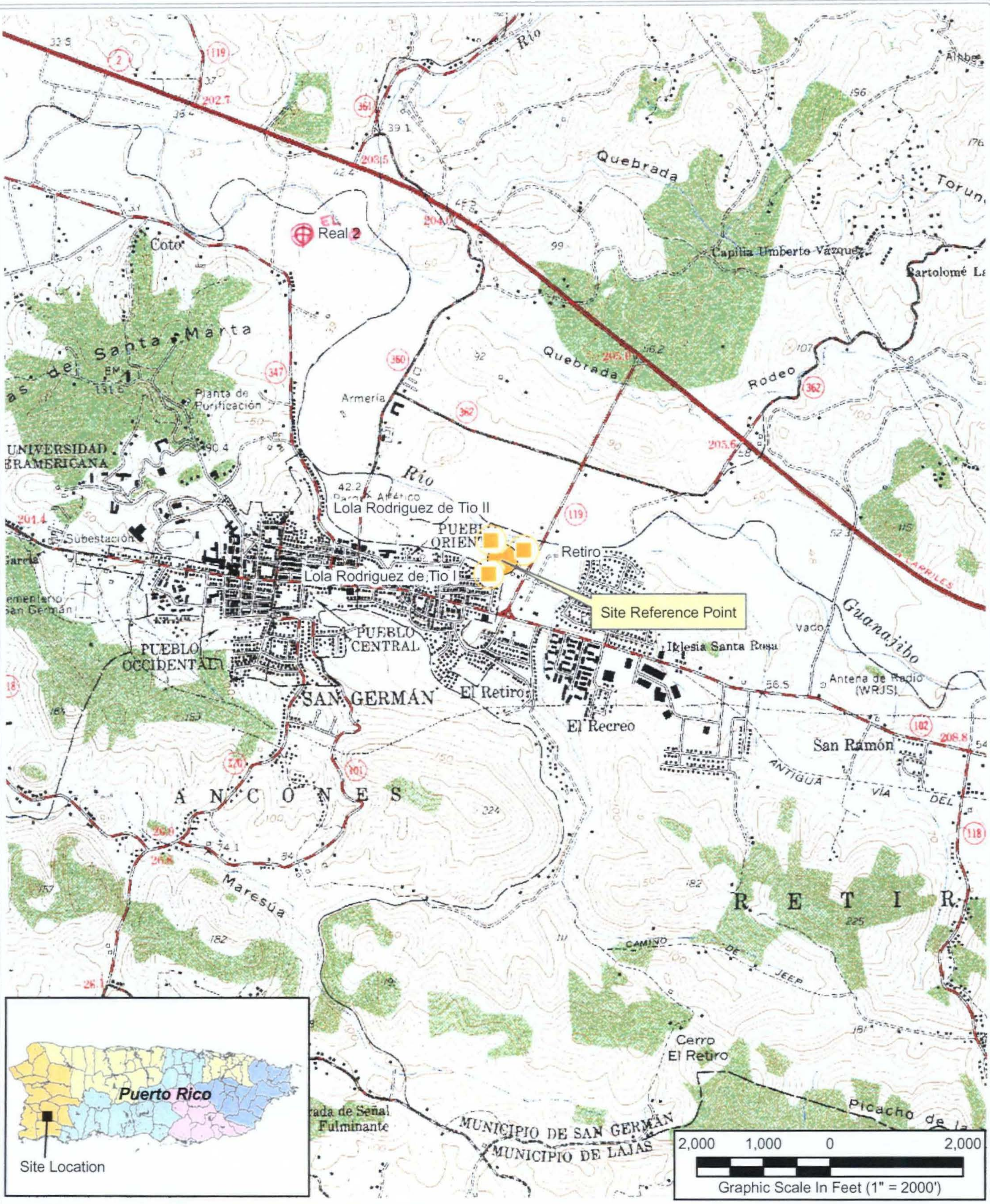
The interconnected system, consisting of the Retiro, Lola Rodriguez de Tio I, and Lola Rodriguez de Tio II wells, serves a total population of 2,280 people. Wellhead Protection Areas are delineated for the public supply wells, so the plume lies within a designated Wellhead Protection Area.

Response Activities (to date):

EPA is currently conducting an investigation in the San German area in an attempt to locate the source(s) of the contamination.

SECTION II: DOCUMENTATION RECORD

SECTION III: FIGURES



SOURCE:
1. 7.5 Minute Series Topographic Quadrangle: San German, PR.
2. Puerto Rico Aqueduct and Sewer Authority (PRASA). Map: Active and Standby Wells in Puerto Rico. Date Unknown.

TITLE:

Site Location Map
San German Groundwater Contamination
San German, PR

N W E S

PROJECT: San German Groundwater Contamination

CLIENT NAME: U.S. EPA

FIGURE #: 1

DATE: 10/25/2006

WESTON SOLUTIONS
Restoring Resource Efficiency

P:\SAT2\San_German_GW\MXD\03752_SG_Sitemap.mxd

SECTION IV: REFERENCES

HRS DOCUMENTATION RECORD

Name of Site: San German Ground Water Contamination

CERCLIS ID No.: PRN000205957 [Ref. 12, pp. 1–3]

EPA Region: 2 Date Prepared: August 2007

Street Address of Site: * State Road #122 (a.k.a. Road 119)

County and State: San German, Puerto Rico 00683

General Location in the State: southwestern Puerto Rico

Topographic Map: San German, PR

Latitude: * 18° 05' 4.1" North Longitude: * 67° 02' 7.1" West

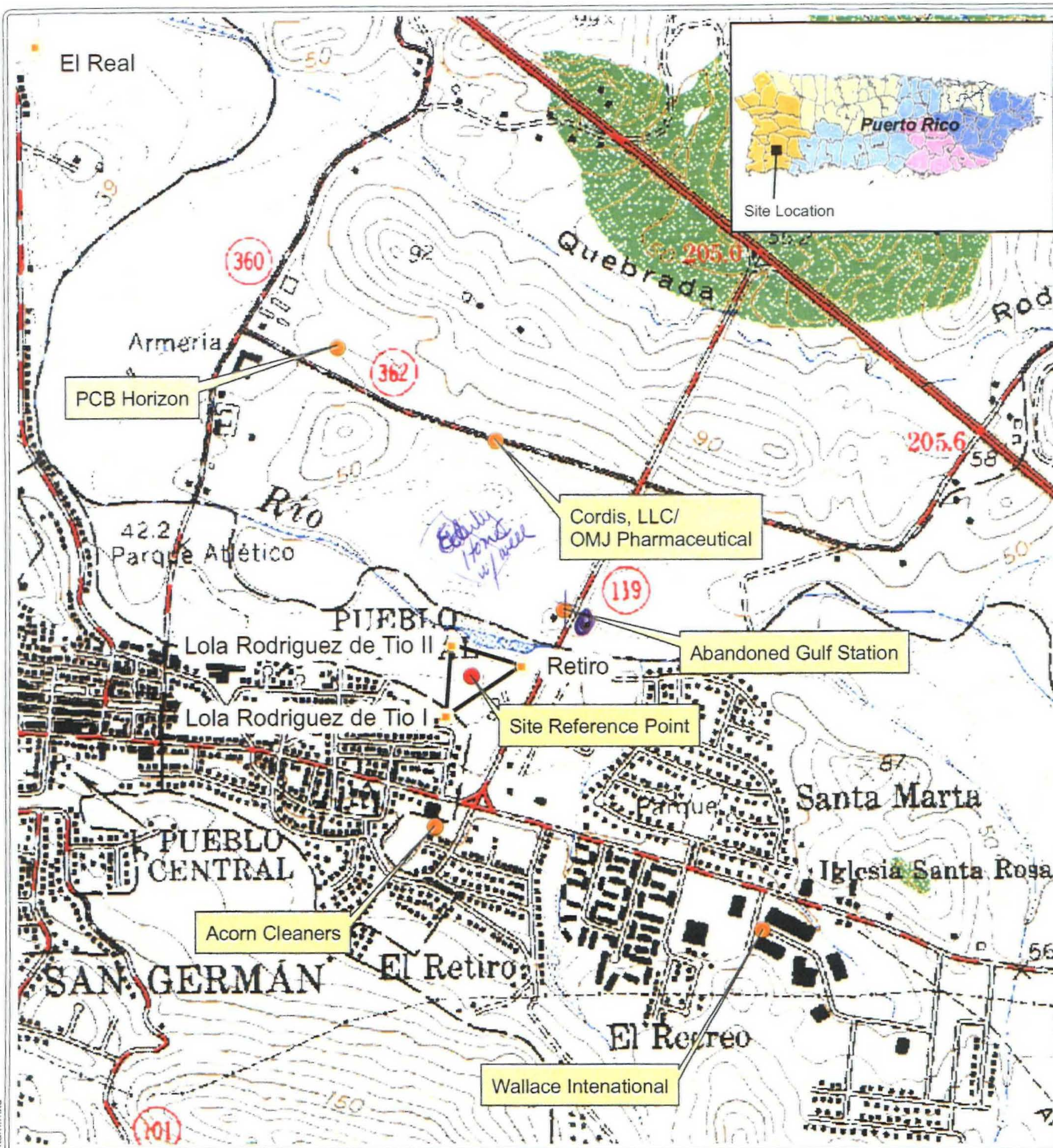
The site consists of a ground water plume with no identified source(s) of contamination. Therefore, the reference point for the site latitude and longitude coordinates is the center of the area of observed ground water contamination [Figure 1; Refs. 1, p. 51595; 3, pp. 10, 12; 4, p. 1].

* The street address, coordinates, and contaminant locations presented in this HRS documentation record identify the general area the site is located. They represent one or more locations EPA considers to be part of the site based on the screening information EPA used to evaluate the site for NPL listing. EPA lists national priorities among the known "releases or threatened releases" of hazardous substances; thus, the focus is on the release, not precisely delineated boundaries. A site is defined as where a hazardous substance has been "deposited, stored, placed, or otherwise come to be located." Generally, HRS scoring and the subsequent listing of a release merely represent the initial determination that a certain area may need to be addressed under CERCLA. Accordingly, EPA contemplates that the preliminary description of facility boundaries at the time of scoring will be refined as more information is developed as to where the contamination has come to be located.

Scores

Ground Water Pathway	100.00
Surface Water Pathway	Not Scored
Soil Exposure Pathway	Not Scored
Air Pathway	Not Scored

HRS SITE SCORE 50.00



LEGEND:
- Public Supply Well
- Area of Observed Ground Water Contamination
- Site Reference Point (Geometric Center of Observed Ground Water Contamination)
- Possible Source to Groundwater Contamination

SOURCES:
1. 7.5 Minute Series Topographic Quadrangle: San German, PR.
2. Puerto Rico Aqueduct and Sewer Authority (PRASA). Map: Active and Standby Wells in Puerto Rico. Date Unknown.
3. Weston Solutions, Inc. (Weston). Pre-CERCLIS Screening Report, San German Site Discovery Initiative. Document Control No. SAT2.20113.023.249. September 2006.

CLIENT NAME: U.S. EPA

PROJECT: San German Groundwater Contamination

DATE: 8-6-2007

TITLE:

Figure 1 - Site Location Map
San German Groundwater Contamination
San German, PR

N W E S

SCALE: 1,000 500 0 1,000 2,000 3,000 Feet

WESTON SOLUTIONS

P:\SAT2\San_German_GW\MXD\04877_SG_GW_Contam.mxd

HRS DOCUMENTATION RECORD--REVIEW COVER SHEET

Name of Site: San German Ground Water Contamination

CERCLIS ID No.: PRN000205957

Date Prepared: August 2007

Contact Persons

Site Investigations: Ildefonso Acosta (212) 637-4344
U.S. Environmental Protection Agency
New York, NY

Documentation Record: Dennis Munhall (212) 637-4343
U.S. Environmental Protection Agency
New York, NY

Dennis Foerter, CHMM (732) 417-5842
Weston Solutions, Inc. (Region 2 SAT-2 contractor)
Edison, NJ

Pathways, Components, or Threats Not Scored

The surface water, soil exposure, and air pathways were not scored because the listing decision is not significantly affected by those pathways. The site score is sufficient to list the site on the ground water pathway score.

This page has been left blank intentionally.

WORKSHEET FOR COMPUTING HRS SITE SCORE
San German Ground Water Contamination

		S	S^2
1.	Ground Water Migration Pathway Score (S_{gw}) (from Table 3-1, line 13)	100.00	10,000
2a.	Surface Water Overland/Flood Migration Component (from Table 4-1, line 30)	Not Scored	
2b.	Ground Water to Surface Water Migration Component (from Table 4-25, line 28)	Not Scored	
2c.	Surface Water Migration Pathway Score (S_{sw}) Enter the larger of lines 2a and 2b as the pathway score.	Not Scored	
3.	Soil Exposure Pathway Score (S_s) (from Table 5-1, line 22)	Not Scored	
4.	Air Migration Pathway Score (S_a) (from Table 6-1, line 12)	Not Scored	
5.	Total of $S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2$	10,000	
6.	**HRS Site Score** Divide the value on line 5 by 4 and take the square root	50.00	

GROUND WATER MIGRATION PATHWAY SCORESHEET
San German Ground Water Contamination

GROUND WATER MIGRATION PATHWAY Factor Categories & Factors Likelihood of Release to an Aquifer Aquifer: Bedrock Aquifer	MAXIMUM VALUE	VALUE ASSIGNED
1. Observed Release	550	550
2. Potential to Release		
2a. Containment	10	
2b. Net Precipitation	10	
2c. Depth to Aquifer	5	
2d. Travel Time	35	
2e. Potential to Release [lines 2a (2b+2c+2d)]	500	
3. Likelihood of Release	550	550
Waste Characteristics		
4. Toxicity/Mobility	*	10,000
5. Hazardous Waste Quantity	*	100
6. Waste Characteristics	100	32
Targets		
7. Nearest Well	50	50
8. Population		
8a. Level I Concentrations	**	22,800
8b. Level II Concentrations	**	0
8c. Potential Contamination	**	0
8d. Population (lines 8a+8b+8c)	**	22,800
9. Resources	5	0
10. Wellhead Protection Area	20	20
11. Targets (lines 7+8d+9+10)	**	22,870
12. Targets (including overlaying aquifers)	**	22,870
13. Aquifer Score (lines 3x6x12 divided by 82,500)	100	100
GROUND WATER MIGRATION PATHWAY SCORE (Sgw)	100	100.00

* Maximum value applies to waste characteristics category.

** Maximum value not applicable.

REFERENCES

Reference Number	Description of the Reference
1.	U.S. Environmental Protection Agency (EPA). Hazard Ranking System, Final Rule, Federal Register, Volume 55, No. 241. December 14, 1990. [137 pages]
2.	EPA. Superfund Chemical Data Matrix, SCDM Data Versions: 1/27/2004, Appendices B-I (Hazardous Substances Factor Values), B-II (Hazardous Substances Benchmarks, and C (Synonyms); and 3/17/2004, Trichloroethylene (TCE) updates. January and March 2004. [57 pages]
3.	Gilliland, Gerry, Weston Solutions, Inc. (Weston). Latitude and Longitude Coordinates Worksheet, San German Ground Water Contamination, San German, PR. July 31, 2007. [12 pages]
4.	U.S. Department of the Interior Geological Survey (USGS). San German Quadrangle, Puerto Rico, 7.5-Minute Series (Topographic). 1966. [1 page]
5.	Foerter, Dennis J., Weston. Project Note to San German Ground Water Contamination File (W.A. No.: 52), Subject: Analytical Data – PRASA San German Urbano Wells. October 24, 2006. [44 pages]
6.	Foerter, Dennis J., Weston. Project Note to San German Ground Water Contamination File (W.A. No.: 52), Subject: Ground Water Populations – San German Ground Water Contamination. October 24, 2006. [4 pages]
7.	Foerter, Dennis J., Weston. Project Note to San German Ground Water Contamination File (W.A. No.: 52), Subject: PRDOH Closure/Shutdown Order – Retiro Well. October 24, 2006. [8 pages]
8.	EPA Hazardous Waste Support Section. Record of Communication to ESAT/RSCC and attached CLP Data Assessment, Subject: CLP [Organic] Data Package for Quality Assurance Review, Site: San German, Case #: 35465. June 29 – July 13, 2006. [178 pages]
9.	Foerter, Dennis J., Weston. Letter to Ildefonso Acosta, EPA, Subject: [Attached] Sampling Trip Report, Work Assignment No. 023, San German Site Discovery Initiative, Contract No. EP-W-05-048. June 28, 2006. [14 pages]
10.	Puerto Rico Environmental Quality Board (PREQB). Final Wellhead Protection Program. April 1991. [158 pages]
11.	EPA. Region 2 Water, Wellhead Protection Program. From http://www.epa.gov/region02/water/whp.htm. Web Page last updated on May 31, 2006; Accessed and printed on October 11, 2006. [1 page]
12.	EPA. Superfund Information Systems, Superfund Site Information, San German Ground Water Contamination. From http://cfpub.epa.gov/. Web Page last updated on December 20, 2006; Accessed and printed on April 11, 2007. [3 pages]
13.	Foerter, Dennis J., Weston. Project Note to San German Ground Water Contamination File (W.A. No.: 52), Subject: San German Source Investigation. April 26, 2007. [15 pages]
14.	Foerter, Dennis J., Weston. Sampling Trip Report, Wallace International, DCN No.: SAT2.20113.053.332, W.O. No.: 20113.011.001.0053.00, Case No.: 36113. February 1, 2007. [33 pages]
15.	Michael, Adly, EPA RSCC – Region II. Record of Communication to Ildefonso Acosta, EPA, Subject: [Attached] Quality Assured Data, Wallace International site, CLP case # 36113, SDGs # B3RS5, B3RS7, B3RW0, total of 18 water and 32 soil samples analyzed for VOA. February 27, 2006. [264 pages]

REFERENCES (continued)

Reference Number	Description of the Reference
16.	Foerter, Dennis J., Weston. Sampling Trip Report, Acorn Cleaners, DCN No.: SAT2.20113.055.334, W.O. No.: 20113.011.001.0055.00, Case No.: 36112. February 2, 2007. [12 pages]
17.	EPA Hazardous Waste Support Section (HWSS)/RSCC. Record of Communication to HWSS ESAT-TOPO and attached CLP Data Assessment, Subject: CLP [Organic] Data Package for Quality Assurance Review, Site: Acorn Cleaners, Case #: 36112. February 7–15, 2006. [95 pages]
18.	Foerter, Dennis J., Weston. Sampling Trip Report, Abandoned Gulf Station, DCN No.: SAT2.20113.054.333, W.O. No.: 20113.011.001.0054.00, Case No.: 36111. February 2, 2007. [15 pages]
19.	EPA Hazardous Waste Support Section (HWSS)/RSCC. Record of Communication to HWSS ESAT-TOPO and attached CLP Data Assessment, Subject: CLP [Organic] Data Package for Quality Assurance Review, Site: Abandoned Gulf Station, Case #: 36111. February 6–15, 2006. [114 pages]
20.	Renken, Robert A., USGS, et al. Geology and Hydrogeology of the Caribbean Islands Aquifer System of the Commonwealth of Puerto Rico and the U.S. Virgin Islands; excerpts. USGS Professional Paper 1419. 2002. [8 pages]
21.	Rodríguez-Martínez, Jesús and Fernando Gómez-Gómez, USGS Caribbean Science Water Center. Geology and Hydrology Conditions of the San Germán Ground Water Contamination Site, Preliminary Report, IAG # DW14941962-01-3. March 21, 2007. [15 pages]
22.	Gilliland, Gerald V., Weston. Project Note to San German Ground Water Contamination File (W.A. No.: 52), Subject: PRASA Well Construction Details. August 3, 2007. [4 pages]
23.	Foerter, Dennis, Weston. Site Logbook, San German Site Discovery, W.O. 20113.011.001.0023.00, DCN: SAT2.20113.023.001. June 20, 2006. [8 pages]
24.	Munch, J.W., ed., EPA National Exposure Research Laboratory. Method 502.2, Volatile Organic Compounds in Water by Purge and Trap Capillary Column Gas Chromatography with Photoionization and Electrolytic Conductivity Detectors in Series, Revision 2.1. EPA Office of Research and Development. 1995. [35 pages]
25.	Munch, J.W., ed., EPA National Exposure Research Laboratory. Method 524.2, Measurement of Purgeable Organic Compounds in Water by Capillary Column Gas Chromatography/Mass Spectrometry, Revision 4.1. EPA Office of Research and Development. 1995. [48 pages]
26.	EPA. Multi-Media, Multi-Concentration, Organic Analytical Service for Superfund (SOM01.1), liminary Report, IAG # DW14941962-01-3. EPA Office of Solid Waste and Emergency Response (OSWER) Document 540-F-05-008. January 2006. [6 pages]
27.	Foerter, Dennis J., Weston. Pre-CERCLIS Screening Report, San German Site Discovery Initiative, San German, Puerto Rico, document Control No. SAT2.20113.023.249. Prepared for EPA. September 2006. [34 pages]
28.	Rodríguez, José M., USGS. Assessment of Ground-Water Withdrawals at Municipal Industrial Parks in Puerto Rico, 2000; excerpts. Scientific Investigation Report 2004-5029. Prepared in cooperation with Puerto Rico Industrial Development Company (PRIDCO). 2004. [7 pages]

REFERENCES (continued)

Reference Number	Description of the Reference
29.	Veve, Thalia D., USGS. Atlas of Ground-Water Resources in Puerto Rico and the U.S. Virgin Islands, Section 2.3.2: Guanajibo Region (pp. 83-90). Water Resources Investigations Report 94-4198. Prepared in cooperation with EPA. 1996. [10 pages]
30.	Gilliland, Gerry, Weston. Project Note to San German Ground Water Contamination File (W.A. No.: 52), Subject: Analytical Data – PRASA Retiro Well. August 3, 2007. [5 pages]
31.	Puerto Rico Aqueduct and Sewer Authority (PRASA). Water Quality Reports, San German Urbano System, PWS ID 3323. 2002–2006. [38 pages]

INTRODUCTION

The San German Ground Water Contamination site (CERCLIS ID No. PRN000205957) consists of a ground water plume with no identified source(s) of contamination. It is located in the municipality of San German, Puerto Rico [Refs. 4, p. 1; 12, pp. 1–3]. The geographic coordinates of the site are 18° 05' 4.1" north latitude and 67° 02' 7.1" west longitude [Figure 1; Refs. 3, pp. 10, 12; 4, p. 1].

The San German Urbano public water system consists of seven wells and two surface water intakes serving an estimated population of 25,000 people. Three of these wells (i.e., Retiro, Lola Rodriguez de Tio I [hereinafter referred to as "Lola I"], and Lola Rodriguez de Tio II ["Lola II"]) acted as an independent interconnected system with approximately 800 connections [Ref. 6, pp. 1–4]. Quarterly ground water samples collected by the system's operator, Puerto Rico Aqueduct and Sewer Authority (PRASA), indicate that the chlorinated solvents tetrachloroethylene (PCE) and cis-1,2-dichloroethylene (cis-1,2-DCE) were detected in all three wells during the period 2001 to 2005. The maximum concentrations of PCE and cis-1,2-DCE detected in these wells during this period were 6.4 micrograms per liter (µg/L) and 1.2 µg/L, respectively [Ref. 5, pp. 1–2, 6, 9, 11, 14–26, 28–29, 31–35, 38–44].

On January 17, 2006, Puerto Rico Department of Health (PRDOH) ordered PRASA to close the Retiro well because of PCE concentrations exceeding the Maximum Contaminant Level (MCL) of 5 µg/L [Ref. 7, pp. 2–6]. The order indicated that in addition to being detected in the Retiro well, PCE was also detected in tap water samples collected from distributed water [Ref. 7, pp. 3, 6]. PRASA responded to this order by taking the well out of operation on January 19, 2006; the pump was removed on February 1, 2006 [Ref. 7, pp. 7–8].

Ground water samples collected by U.S. Environmental Protection Agency (EPA) in June 2006 confirm the presence of PCE (1.6 µg/L) and cis-1,2-DCE (1.5 µg/L) in Lola I [Refs. 8, pp. 17–18; 9, p. 5; 23, p. 4]. Trichloroethylene (TCE) was also detected in this well at a concentration of 0.54 µg/L [Refs. 8, p. 18; 9, p. 5]. Samples collected from background well El Real showed non-detects for PCE, cis-1,2-DCE, and TCE [Refs. 8, pp. 23–24; 9, p. 5; 23, p. 5].

In July 2006, EPA conducted a reconnaissance effort at 44 sites within the municipality of San German as part of a Site Discovery Initiative to identify potential hazardous waste sites [Ref. 27, p. 1]. In January 2007, EPA conducted a source investigation of three facilities in San German which were identified as potential sources to the ground water plume. This investigation included two Preliminary Assessment/Site Inspections (PA/SI) and one Expanded Site Inspection (ESI). These investigations included the use of direct-push technology to complete soil borings at each of the facilities. Surface and subsurface soil samples and ground water samples were collected from these borings. Although chlorinated solvents were detected at two of these facilities [Ref 13, pp. 1–15], EPA did not identify the source of ground water contamination in the public supply wells during its investigations.

The interconnected water supply system consisting of the Retiro, Lola I, and Lola II wells served an estimated population of 2,280 people in 2005 [Ref. 6, pp. 1–4]. Wellhead Protection Areas are delineated for the public supply wells, so the plume lies within a designated Wellhead Protection Area [Refs. 10, pp. 29–45; 11, p. 1].

SOURCE DESCRIPTION

2.2 SOURCE CHARACTERIZATION

Number of the source: 1

Source Type of the source: Other

Name and description of the source: Ground Water Plume – San German, Puerto Rico

Source 1 is considered a contaminated ground water plume of unknown volume without an identified source. Three wells associated with PRASA's San German Urbano Water system (i.e., Retiro, Lola I, and Lola II) acted as an independent interconnected system with approximately 800 connections [Ref. 6, p. 2]. Quarterly ground water samples collected by PRASA indicate that the chlorinated solvents PCE and cis-1,2-DCE were detected in all three wells during the period 2001 to 2005. The maximum concentrations of PCE and cis-1,2-DCE detected in these wells during this period were 6.4 micrograms per liter (μg/L) and 1.2 μg/L, respectively [Ref. 5, pp. 1–2, 6, 9, 11, 14–26, 28–29, 31–35, 38–44]. In January 2006, PRDOH ordered PRASA to close the Retiro well because the PCE concentration exceeded the MCL of 5 μg/L [Ref. 7, pp. 2–6].

Ground water samples collected by EPA in June 2006 confirm the presence of PCE (1.6 μg/L) and cis-1,2-DCE (1.5 μg/L) in Lola I [Refs. 8, pp. 17–18; 9, p. 5; 23, p. 4]. TCE was also detected in this well at a concentration of 0.54 μg/L [Refs. 8, p. 18; 9, p. 5]. In addition, PCE was detected at an estimated concentration below the sample quantitation limit (SQL) in the Lola II well [Refs. 8, p. 21; 9, pp. 5, 10; 23, p. 4]. EPA was unable to collect a sample from the Retiro well because the pump had been removed in February 2006 in response to PRDOH's shutdown order [Refs. 7, pp. 7–8, 9, p. 3]. Samples collected from background well El Real showed non-detects for PCE, cis-1,2-DCE, and TCE [Refs. 8, pp. 23–24; 9, p. 5; 23, p. 5].

Location of the source, with reference to a map of the site:

The ground water plume is identified by contamination found in the Retiro, Lola I, and Lola II public supply wells. For the purpose of this report, these wells represent a minimum of the plume extent. The well locations are shown in Figure 1. San German is located in the southwestern portion of Puerto Rico [Ref. 4, p. 1].

Containment

Release to ground water:

Based on evidence of both hazardous substance migration (contamination detected in ground water samples collected from three public supply wells) and due to the fact that there is nothing to prevent the plume from migrating further, a containment factor of 10 is assigned [Refs. 1, p. 51596; 5, pp. 2, 6, 9, 11, 14–26, 28–29, 31–35, 38–44; 8, pp. 17–18].

2.4.1 Hazardous Substances

Ground water samples collected by PRASA from 2001 to 2005 and by EPA in 2006 show the presence of chlorinated solvents in three public supply wells, as described below. Background sample locations and contaminant levels for comparison to the contaminated samples collected during PRASA's 2001 to 2005 sampling events are discussed in Section 3.1.1 of this document.

PRASA Quarterly Sampling – Ground Water Samples: 2001 to 2005

Quarterly ground water samples collected by PRASA indicate that PCE and cis-1,2-DCE were detected regularly in the Lola I, Lola II, and Retiro wells during the period 2001 to 2005 [Ref. 5, pp. 1–2, 6, 9, 11, 14–26, 28–29, 31–35, 38–44]. Each sample listed below was collected and analyzed according to EPA Method 502.2 or EPA Method 524.2 [Ref. 5, pp. 2, 6, 9, 11, 14–26, 28–29, 31–35, 38–44]. The applicable concentration range of Method 502.2 is approximately 0.02–200 µg/L [Ref. 24, p. 3]. The applicable concentration range of Method 524.2 can be 0.02–200 µg/L or 0.02–20 µg/L [Ref. 25, p. 4]. Both methods have a number of quality controls, including demonstrations of capability, accuracy, and precision; analysis of blanks and surrogates; and determinations of Method Detection Limits (MDL) for each analyte [Refs. 24, pp. 14–17; 25, pp. 16–19]. EPA defines MDL as the "lowest concentration of analyte that a method can detect reliably in either a sample or blank" [Ref. 1, p. 51586]. In all cases where PRASA presented an MDL (a.k.a. LOD, Limit of Detection) for PCE or cis-1,2-DCE, the value matches EPA's current Contract Required Quantitation Limit (CRQL) of 0.50 µg/L for each compound [Refs. 5, pp. 1–2, 6, 9, 11, 14–26, 28–29, 31–35, 38–44; 26, p. 2].

Note: PRASA presented its analyte concentrations and MDLs in milligrams per liter (mg/L). EPA has converted those values to µg/L for consistency with the EPA data presented in this report.

Lola I

Hazardous Substance	Evidence	MDL (µg/L)*	Reference(s)
cis-1,2-DCE	4/26/01 (0.47 µg/L)	not listed	5, p. 15
	1/23/02 (0.6 µg/L)	not listed	5, p. 16
	12/26/02 (0.5 µg/L)	0.50	5, p. 21
	10/23/03 (0.6 µg/L)	0.50	5, p. 31
	11/6/03 (0.5 µg/L)	0.50	5, p. 34
PCE	4/26/01 (2.4 µg/L)	0.50	5, pp. 4, 9
	4/26/01 (2.1 µg/L)	not listed	5, p. 15
	1/23/02 (6.4 µg/L)	not listed	5, p. 16
	7/23/02 (1.7 µg/L)	not listed	5, p. 18
	12/26/02 (4.2 µg/L)	0.50	5, p. 21
	1/24/03 (1.3 µg/L)	0.50	5, p. 24
	5/5/03 (1.1 µg/L)	0.50	5, p. 25
	9/25/03 (3.4 µg/L)	0.50	5, p. 28
	10/23/03 (5.7 µg/L)	0.50	5, p. 32
	11/6/03 (3.2 µg/L)	0.50	5, p. 34
	5/12/04 (1.4 µg/L)	0.50	5, p. 38
	8/19/04 (2.2 µg/L)	0.50	5, p. 40

* The MDL for both cis-1,2-DCE and PCE is thought to be 0.50 µg/L for all of the sample analyses, however, it was not listed as such on the laboratory report for all of the reporting dates.

PRASA Quarterly Sampling – Ground Water Samples: 2001 to 2005 (continued)

Lola II

Hazardous Substance	Evidence	MDL (µg/L)*	Reference(s)
cis-1,2-DCE	1/29/02 (0.7 µg/L)	not listed	5, p. 17
PCE	4/26/01 (2.5 µg/L)	not listed	5, p. 2
	4/26/01 (2.6 µg/L)	0.50	5, p. 6
	1/29/02 (6.2 µg/L)	not listed	5, p. 17
	12/26/02 (4.2 µg/L)	0.50	5, p. 20

* The MDL for both cis-1,2-DCE and PCE is thought to be 0.50 µg/L for all of the sample analyses, however, it was not listed as such on the laboratory report for all of the reporting dates.

Retiro

Hazardous Substance	Evidence	MDL (µg/L)*	Reference(s)
cis-1,2-DCE	6/29/03 (1.2 µg/L)	0.50	5, p. 26
PCE	4/26/01 (1.0 µg/L)	0.50	5, pp. 3, 11
	4/26/01 (0.8 µg/L)	not listed	5, p. 14
	7/29/02 (1.4 µg/L)	not listed	5, p. 19
	12/26/02 (1.0 µg/L)	0.50	5, p. 22
	1/24/03 (1.1 µg/L)	0.50	5, p. 23
	6/29/03 (0.6 µg/L)	0.50	5, p. 26
	9/25/03 (0.9 µg/L)	0.50	5, p. 29
	10/23/03 (1.4 µg/L)	0.50	5, p. 33
	5/12/04 (1.7 µg/L)	0.50	5, p. 35
	8/19/04 (3.1 µg/L)	0.50	5, p. 39
	12/4/04 (5.0 µg/L)	0.50	5, p. 41
	3/11/05 (4.1 µg/L)	0.50	5, p. 42
	3/16/05 (4.0 µg/L)	0.50	5, p. 43
	7/10/05 (3.6 µg/L)	0.50	5, p. 44

* The MDL for both cis-1,2-DCE and PCE is thought to be 0.50 µg/L for all of the sample analyses, however, it was not listed as such on the laboratory report for all of the reporting dates.

EPA Sampling Event – Ground Water Samples: June 2006

EPA collected ground water samples from the San German Urbano wells that were in operation on June 20, 2006 [Refs. 9, pp. 5, 10–11; 23, pp. 4–5]. The samples were analyzed for Target Compound List (TCL) and Target Analyte List (TAL) contaminants through the Contract Laboratory Program (CLP) [Ref. 9, p. 3]. EPA was unable to collect a sample from the Retiro well because the well was closed and the pump had previously been removed [Ref. 9, p. 3]. Sample SG-GW01 was collected from the Lola I well and background sample SG-GW03 was collected from the El Real well [Refs. 9, pp. 5, 10–11; 23, pp. 4–5]. In addition to the EPA data listed below, PCE was detected at an estimated concentration below the SQL in sample SG-GW02 collected from the Lola II well [Refs. 8, p. 21; 9, pp. 5, 10]. EPA validated the trace volatile organic compounds (VOC) data according to Standard Operating Procedure (SOP) HW-34 (Revision 0), "USEPA Region II Data Validation SOP for Statement of Work SOM01.1" [Ref. 8, pp. 2, 89–112]. Except for one compound unrelated to the site, EPA found the VOC data to be valid and acceptable, including meeting the CRQL requirements [Ref. 8, pp. 2, 17–40, 107].

EPA Sampling Event – Ground Water Samples: June 2006 (continued)

Hazardous Substance	Evidence	SQL (µg/L)	Reference(s)
TCE	SG-GW01 (0.54 µg/L)	0.50	8, pp. 18, 107
	SG-GW03 (ND)*	0.50	8, pp. 24, 107
cis-1,2-DCE	SG-GW01 (1.5 µg/L)	0.50	8, pp. 17, 107
	SG-GW03 (ND)*	0.50	8, pp. 23, 107
PCE	SG-GW01 (1.6 µg/L)	0.50	8, pp. 18, 107
	SG-GW03 (ND)*	0.50	8, pp. 24, 107

ND - contaminant not detected
* - background concentration

2.4.2 Hazardous Waste Quantity

2.4.2.1.1 Hazardous Constituent Quantity

The information available is not sufficient to evaluate Tier A source hazardous waste quantity; therefore, hazardous constituent quantity is not scored (NS).

Hazardous Constituent Quantity (C) Value: NS

2.4.2.1.2 Hazardous Wastestream Quantity

The information available is not sufficient to evaluate Tier B source hazardous waste quantity; therefore, hazardous wastestream quantity is not scored.

Hazardous Wastestream Quantity (W) Value: NS

2.4.2.1.3 Volume

Because there are wells with samples showing contamination in the ground water but the volume of the contaminated area has not been determined, the volume of the ground water contamination is considered to be greater than 0 cubic yards but unknown [Refs. 5, pp. 2, 6, 9, 11, 14–26, 28–29, 31–35, 38–44; 8, pp. 17–18]. Therefore, volume (V) is assigned a value of >0 but unknown [Ref. 1, p. 51591].

Dimension of source (yd^3): >0

Volume (V) Assigned Value: >0

2.4.2.1.4 Area

Since the volume of the waste source can be determined, a value of 0 is given for area measurement [Ref. 1, p. 51591].

Area of source (ft^2): N/A

Area (A) Assigned Value: 0

2.4.2.1.5 Source Hazardous Waste Quantity Value

The source hazardous waste quantity value for Source 1 is >0 but unknown for Tier C - Volume [Ref. 1, p. 51591].

Source Hazardous Waste Quantity Value: >0

SITE SUMMARY OF SOURCE DESCRIPTIONS

Source Number	Source Hazardous Waste Quantity Value	Ground Water	Containment Surface Water	Gas	Air Particulate
1	>0	10	NS	NS	NS

NS = Not Scored

Other Possible Sources

In July 2006, EPA conducted a reconnaissance effort at 44 sites within the municipality of San German as part of a Site Discovery Initiative to identify potential hazardous waste sites [Ref. 27, p. 1]. The reconnaissance identified three facilities as potential sources of the ground water plume as well as two large facilities north of the contaminated wells that are regulated under Resource Conservation and Recovery Act (RCRA). One is an inactive facility where contaminated soil and ground water are being remediated in accordance with a voluntary Interim Measure under the RCRA Corrective Action process. The other is an active pharmaceutical manufacturer regulated as a RCRA Large Quantity Generator (LQG) [Ref. 27, pp. 11, 19, 31, 32].

In January 2007, EPA conducted a source investigation of three facilities in San German identified during the Site Discovery Initiative as potential sources of the ground water plume. The investigation included two PA/SIs and one ESI. The source investigations included the use of direct-push technology to complete soil borings at each of the facilities, and to collect surface and subsurface soil samples and ground water samples from the borings [Ref. 13, pp. 1–15].

Descriptions of the five aforementioned sites identified during the Site Discovery Initiative, including the results of the three source investigations, are provided below:

1. Wallace International

The Wallace International (Wallace) facility consists of two buildings on Calle B within the Retiro Industrial Park, which is owned by Puerto Rico Industrial Development Company (PRIDCO), in a mixed commercial/light industrial/residential area of San German [Ref. 13, p. 1]. In addition to the current facility, Wallace operated in Retiro Industrial Park's Building No. S-1404-0-87, located on Calle A to the northwest [Ref. 13, p. 1]. Wallace previously operated under the name of International Silver de PR, Inc. Current operations at the facility, which occupies 70 employees, include the casting and finishing of table flatware. Operations have taken place at the current facility since 1973. According to Wallace personnel, the facility was previously used by another company for the manufacture of softballs [Refs. 13, p. 1; 27, p. 27]. During its operational history, the facility has generated spent solvents including PCE, TCE, and 1,1,1-trichloroethane (TCA). Other wastes include spent nitric and sulfuric acids. Disposal of wastes is regulated under Wallace's RCRA Small Quantity Generator (SQG) permit (EPA ID No. PRD090405648) [Refs. 13, p. 1; 27, p. 28].

As part of the Site Discovery Initiative in July 2006, EPA and Puerto Rico Environmental Quality Board (PREQB) conducted a facility inspection at the Wallace site. During this inspection, the acid storage area inside the facility was noted to be in good condition with secondary containment. Waste solvents and oils were observed to be stored outside behind the facility building. Drums of TCE and waste oil were observed to be stored on asphalt with no secondary containment. The asphalt was noted to be in poor condition, with cracks and several areas of exposed soil. Several drums were rusted, with one observed to be bulging. Broken fluorescent bulbs were noted in an area behind a concrete retaining wall. A half-buried drum and an oil spill (with absorbent spread over it) were also noted in this area. Poor housekeeping was noted throughout the rear exterior of the facility [Refs. 13, p. 1; 27, p. 28].

During the July 2006 facility inspection, Wallace personnel stated that storm water is discharged under a National Pollutant Discharge Elimination System (NPDES) multi-sector permit with EPA. The facility is also permitted by PREQB for air emissions associated with the facility's generator, oxidation baths, and evaporators. Wallace personnel indicated that an on-site well exists on the facility, but the well has not been used in many years. There are no monitoring wells or septic tanks/fields on the facility. PREQB files indicate that the facility has two underground storage tanks (UST) listed as "permanently out-of-use." One tank contained diesel fuel; however, the database does not indicate the contents of the other tank (Refs. 13, pp. 1–2; 27, p. 28].

From January 22–24, 2007, EPA conducted a sampling event at the Wallace facility. During this event, surface soil, subsurface soil, and ground water samples were collected from borings advanced by direct-push technology. Borings were advanced on the current Wallace facility, as well as on two other parcels previously occupied by Wallace. Samples were analyzed for TCL VOCs and TAL metals (excluding cyanide) through the EPA CLP [Ref. 14, pp. 1–33]. Analytical results from this sampling event indicated the presence of VOCs in soil and ground water beneath the facility. VOCs detected in soil included PCE (up to 2,000 micrograms per kilogram [µg/kg]), TCE (up to 3,300 µg/kg), cis-1,2-DCE (up to 5,000 µg/kg), and vinyl chloride (up to 900 µg/kg) [Refs. 14, pp. 4–8, 13–14; 15, pp. 205–264]. VOCs detected in ground water included PCE (up to 19,000 µg/L), TCE (up to 2,900 µg/L), cis-1,2-DCE (up to 700 µg/L), and vinyl chloride (up to 150 µg/L) [Ref. 14, pp. 9, 10, 13–14; 15, pp. 112–147].

2. Acorn Cleaners

Acorn Cleaners (Acorn) is located at the southern end of the Antongiorgie Building on the western side of Route 122 (just south of its intersection with Calle Luna). Acorn has operated at this location since 1970. Prior to 1970, the land was utilized for agricultural purposes. Acorn currently provides dry cleaning and laundry services to its customers. Since beginning operations, Acorn has utilized a total of two dry cleaning machines; one from 1970 to 1991 and one from 1991 to the present. From 1970 to 1991, the facility used approximately five to six drums of PCE per year. Since 1991, the facility has used approximately one drum of PCE per year. Filters are changed twice per year with used filters being picked up by a waste hauler from San Juan. Acorn was unable to provide documentation for the disposal of the filters. A cooling tower (and associated water tank) is located outside the southwest corner of the building. During an on-site reconnaissance conducted by EPA, a drum of PCE was observed to be stored on the floor inside the building. The rear (i.e., western side) of the property consists of a paved parking lot. An aboveground diesel fuel tank is located in the southwest corner of this parking lot. Residential properties border the Acorns Cleaners to the south. There are no known monitoring wells or USTs on the site [Refs. 13, p. 2; 27, p. 5].

In July 2006, EPA conducted an on-site reconnaissance of the Acorn facility. During the reconnaissance, a drum of PCE was observed to be stored within the site building. The drum was noted to be in good condition; no apparent spills or discharges were noted. According to facility personnel, PCE has been used as part of the dry cleaning process since 1970. There is a paved parking lot behind the building to the west [Refs. 13, p. 2; 27, p. 5].

On January 26, 2007, EPA conducted a sampling event at the Acorn Cleaners facility. During this event, surface soil, subsurface soil, and ground water samples were collected from borings advanced by direct-push technology. Samples were analyzed for TCL VOCs through the EPA CLP [Ref. 16, pp. 1–12]. Analytical results from this sampling event indicated the presence of PCE in one surface soil sample (depth: 0.5–1 foot below ground surface), located immediately south of the Acorn Cleaners facility. PCE was detected in this sample at an estimated concentration of 3.1 µg/kg [Refs. 16, pp. 4, 8; 17, p. 91]. PCE was not detected in ground water samples collected in association with the Acorn Cleaners site [Refs. 16, pp. 4–5; 17, pp. 35–46].

3. Abandoned Gulf Station

In July 2006, EPA and PREQB personnel conducted a facility inspection of an abandoned Gulf station located on the western side of Route 122 (a.k.a. Road 119) just north of Rio Guanajibo. According to PREQB, the Puerto Rico Road Authority (Autoridad de Carreteras) took ownership of the property in November 2005. The property is reportedly part of the upcoming widening of Route 122. During the facility inspection, the building was observed to be dilapidated, with car parts, broken glass, empty drums, and miscellaneous debris located throughout the building and property. An open overhang was observed on the south side of the building. This area was likely used for light mechanical purposes (oil changes) and for washing vehicles. There is a room in the rear of the building believed to have been used for the storage of used oils. Empty drums and tires were observed near the rear of the building. Construction materials (likely for the widening of Route 122) were observed in the rear of the building. The status of USTs at the facility is unknown. No monitoring wells were observed during the facility inspection [Refs. 13, pp. 2, 3; 27, p. 5].

On January 25, 2007, EPA conducted a sampling event at the Abandoned Gulf Station. During this event, surface soil, subsurface soil, and ground water samples were collected from borings advanced by direct-push technology. Samples were analyzed for TCL VOCs and TAL metals (excluding cyanide) through the EPA CLP [Ref. 18, pp. 1–15]. Analytical results from this sampling event indicated the presence of low estimated concentrations of VOCs associated with petroleum in a boring located north of the former gas station [Ref. 18, pp. 4, 8; 19, p. 70]. These included benzene, toluene, ethylbenzene, and xylenes. Chlorinated solvents were not detected in soil or ground water samples collected at the site [Ref. 18, pp. 3–5; 19, pp. 39–71, 81–98].

4. Cordis, LLC / OMJ Pharmaceutical, Inc.

The Cordis, LLC / OMJ Pharmaceutical, Inc. facility is located on Route 362 in a commercial/industrial area of San German. The property is owned by PRIDCO and currently occupied by Cordis and OMJ. Coopervision PR reportedly occupied the facility for an unknown period of time prior to 1993. IO Labs, the predecessor to OMJ, began operating at the facility in 1993, and changed its name to OMJ Pharmaceutical, Inc. in 1995. OMJ currently manufactures a cream used by diabetics; current activities at Cordis include the coating and crimping of stents. The facility consists of eight buildings. OMJ's manufacturing operations take place in Building B-1, and OMJ shares a laboratory with Cordis in Building B-5. Cordis operates within the remaining five buildings (i.e., Buildings B-2, B-2A, B-3, B-6, B-7, and B-10). Currently 1,500 people work at the facility [Ref. 27, p. 11].

As of 2005, Cordis assumed all environmental permitting activities for the facility, including the portion occupied by OMJ. Waste disposal for Cordis and OMJ are regulated under Cordis' RCRA LQG permit. Drums of waste generated by both facilities are stored in two hazardous waste storage areas (one for Cordis and one for OMJ) located along the facility's northern border. A review of RCRA files indicate that Full RCRA Generator and accompanying RCRA Land Disposal Restrictions inspections were performed at IO Labs in 1993 and OMJ in 1995. During these inspections, the facility was found to be in full compliance with local and federal regulations. The facility also has a permit with PRASA for the discharge of process wastewater. Wastewater is tested and transferred for neutralization prior to discharge via Outfall #001. In addition, the facility has air permits for emissions associated with the coating modules and the facility's emergency generator. Emissions associated with the coating process include isopropyl alcohol, toluene, tetrahydrofuran, and particulates. Emissions associated with the emergency generator include diesel fuel and kerosene. Facility storm water is discharged under a NPDES permit with EPA [Ref. 27, p. 11].

During the on-site reconnaissance in July 2006, the hazardous waste storage areas for Cordis and OMJ were observed along the facility's northern border. Cordis' hazardous waste storage area is located behind Building B-2; OMJ's hazardous waste storage area is located to the rear of Building B-3. These areas were noted to be in good condition (i.e., no staining or evidence of spills). In Cordis' hazardous waste storage area, drums were stored on pallets with secondary containment drains located immediately outside the area. OMJ's hazardous waste storage area did not have any materials. A review of Cordis' Contingency Plan (revised May 2005) indicated that three spills of kerosene and one spill of hydraulic oil from a garbage compactor have occurred at the facility since 1995. Cordis personnel stated that each of these spills were immediately contained and cleaned. There are no monitoring wells, septic tanks/fields, or USTs on the facility. A review of on-site documentation provided by Cordis did not indicate that PCE or TCE is used or stored on site [Ref. 27, p. 12].

5. PCB Horizon Technology, Inc.

The PCB Horizon Technology, Inc. (PCB) facility is located on the north side of Route 362 in a commercial/industrial area of San German. The property is owned by PRIDCO, who leases the facility to PCB. In July 2006, the facility was inactive and in the process of being disassembled and decommissioned. During this time, the facility had no power; the building was being gutted at the request of PRIDCO. According to the on-site contact, previous occupants of the facility included Digital Equipment Corporation (1968-1993), Circo Caribe Corp. (1993-1997), and Via Systems de PR, Inc. (1997-2003). Operations conducted at the facility by all of these companies included the manufacture of printed circuit boards [Ref. 27, p. 19].

EPA RCRA files indicate that previous investigations conducted at the facility include a RCRA Facility Assessment and RCRA Facility Investigation. These investigations identified the presence of contaminated soil and ground water under the site. Contaminants included chlorinated ethenes and petroleum hydrocarbons. Under EPA oversight, Digital proceeded to remedy the soil and ground water contamination as a voluntary Interim Measure following requirements of the RCRA Corrective Action process. The facility is currently operating a ground water remediation system, where extraction wells pump contaminated ground water for treatment prior to discharge under a PRASA permit. Approximately 80,000 gallons of contaminated ground water per day are pumped for treatment. The system is operated by Hewlett Packard (formerly Compaq Corporation; formerly Digital Equipment Corp.). The system is currently in operation [Ref. 27, pp. 19–20].

A review of background files indicates that the site appears in CERCLIS under the name "Digital Equipment Corporation" (EPA ID No. PRR991291857). EPA conducted an SI at the facility in 1989. In addition, contaminated soil and ground water at the site are being remediated under a voluntary Interim Measure following the requirements under the RCRA Corrective Action process [Ref. 27, p. 20].

During the on-site reconnaissance in July 2006, three aboveground storage tanks (AST) were observed. Two ASTs contained water (one for fire suppression and one to hold well water). The third AST was a 9,000-gallon tank used to store copper solution from the plating process. This tank was surrounded by a concrete berm for spill containment. EPA observed 2 to 3 feet of water in the bottom of the bermed area. Car batteries were observed to be stored on a concrete surface with no containment. A hazardous waste drum storage facility was also observed. This area included a concrete floor, 3-foot-high concrete walls, and a roof. Hundreds of drums were stored in this area. Ponded water, believed to be the result of a leaking roof, was observed in the hazardous waste drum storage area. Monitoring wells are located throughout the facility. No apparent spills or discharges were observed [Ref. 27, p. 20].

3.0 GROUND WATER MIGRATION PATHWAY

3.0.1 General Considerations

The San German Ground Water Contamination site is located at the edge of the Guanajibo River Valley, one of the largest alluvial valleys of the West Coast ground water province [Ref. 20, pp. 3–4]. The stratigraphic sequence within this valley consists of unconsolidated alluvial to marginal marine deposits underlain by clay and limestone that unconformably overlie volcaniclastic bedrock [Ref. 20, p. 6]. PRASA supply wells associated with the site and other wells in the immediate site vicinity are finished in the volcanic bedrock aquifer, which is considered to be a stratum of limited and local ground water resources [Refs. 20, p. 8; 21, pp. 10–12; 22, pp. 1–4; 28, pp. 6–7].

Boring logs for the San German region, including the boring logs for the Lola I and Retiro wells, show that there is not a continuous confining layer separating the bedrock and alluvial deposits [Refs. 21, pp. 7, 10–12; 22, pp. 1–4]. Therefore, the alluvium and bedrock are evaluated as one hydrogeologic unit [Refs. 1, p. 51595]. The general direction of ground water flow in the vicinity of the site is west-northwest along the along the course of the Guanajibo River [Refs. 4, p. 1; 21, p. 5; 29, p. 9]. The source of water in the PRASA Retiro well might have been induced from the Guanajibo River, due to its proximity to the stream and the limited aquifer storage. The same conditions might have applied to PRASA's Lola I and Lola II wells, which were taken out of service due to low yields. The well yields might have declined due to the lowering of the stream bed as part of a flood channelization works in the Guanajibo River [Ref. 21, p. 7].

The Retiro, Lola I, Lola II, and El Real wells are all finished in the bedrock aquifers [Ref. 22, p. 1]. The elevations of the well bottoms ranges from 32 to 43 feet above mean sea level (AMSL), and the screened intervals range from 32 to 132 feet AMSL [Ref. 22, pp. 1, 3–4]. The interconnected water supply system consisting of the Retiro, Lola I, and Lola II wells served an estimated population of 2,280 people in 2005 [Ref. 6, pp. 1–4]. Wellhead Protection Areas are delineated for the public supply wells, so the plume lies within a designated Wellhead Protection Area [Refs. 10, pp. 29–45; 11, p. 1].

Stratum 1 (shallowest)

Stratum Name: Alluvium

Description: The surficial deposits in the San German Ground Water Contamination area consist of colluvium, landslide, and alluvial deposits of Quaternary age made up of sand clay and gravel. The thickness of alluvial deposits within the San German area is generally less than 100 feet [Ref. 21, p. 4]. Based on the well log of the PRASA Lola I well, the thickness of these deposits is 30 feet at the site location [Refs. 21, p. 12; 22, p. 4].

Stratum 2/Aquifer

Stratum/Aquifer Name: Bedrock Aquifer

Description: The bedrock units underlying the alluvial deposits are, from oldest to youngest, the following: Serpentinite or serpentinized peridotite of Upper Jurassic and Lower Cretaceous age or older, the Mariquita Chert of Upper Jurassic and Lower Cretaceous age with rare amygdular basalt and silicified limestone, the Sabana Grande Formation of Middle Cretaceous age consisting mainly of andesitic tuff and conglomerate with minor basaltic lava and breccia, and an unnamed unit of altered volcanic rocks of presumably Cretaceous age [Ref. 21, p. 4]. As noted above, the San German city wells draw from this aquifer.

3.1 LIKELIHOOD OF RELEASE

3.1.1 Observed Release

Aquifer Being Evaluated: Bedrock aquifer

An observed release is documented for the San German Ground Water Contamination site. Chemical analyses for ground water samples collected from the Lola I, Lola II, and Retiro public supply wells from 2001 to 2006 show the continued presence of chlorinated solvents [Refs. 5, pp. 1, 2, 6, 9, 11, 14–26, 28–29, 31–35, 38–44; 8, pp. 17–18].

All background and contaminated samples documenting the observed release were collected from the aquifer being evaluated (i.e, the Retiro, Lola I, Lola II, and El Real wells are all finished in the bedrock aquifer) [Ref. 22, p. 1]. Samples from the El Real well are evaluated as representative of background conditions due to similar bottom elevation, screened interval, and geologic material to the wells where observed releases occurred [Ref. 22, pp. 1, 3–4]. The compounds found in the wells are not naturally occurring, and the non-detect concentrations in the background well (i.e., El Real) show that they are not ubiquitous in the area [Refs. 5, p. 1; 8, pp. 23–24; 9, pp. 5, 10]. The background samples from El Real were collected within the same general timeframe as the release samples from Lola I, Lola II, and Retiro (2001 to 2005 for PRASA samples, June 2006 for EPA samples) [Refs. 5, p. 1; 9, pp. 5, 10–11].

In addition to background concentrations in the El Real well, two samples collected from the Retiro well show non-detect background concentrations before the well became contaminated [Ref. 30, pp. 1–5]. Consequently, the available data for the Retiro well demonstrate the onset of contamination that led to its shutdown. On January 17, 2006, PRDOH ordered PRASA to close the Retiro well because of PCE concentrations exceeding the MCL of 5 µg/L [7, pp. 2–6]. The order indicated that in addition to being detected in the Retiro well, PCE was also detected in tap water samples collected from distributed water [Ref. 7, pp. 3, 6]. PRASA responded to this order by taking the well out of operation on January 19, 2006; the pump was removed on February 1, 2006 [Ref. 7, pp. 7–8]. The Retiro well served an estimated 1,208 people at the time of its closure [Ref. 6, pp. 1–4].

Chemical Analysis

PRASA Quarterly Sampling – Ground Water Samples: 2001 to 2005

The PRASA quarterly ground water samples were collected and analyzed according to EPA Method 502.2 or EPA Method 524.2 [Refs. 5, pp. 2, 6, 9, 11, 14–26, 28–29, 31–35, 38–44; 31, pp. 4–5]. The applicable concentration range of Method 502.2 is approximately 0.02–200 µg/L [Ref. 24, p. 3]. The applicable concentration range of Method 524.2 can be 0.02–200 µg/L or 0.02–20 µg/L [Ref. 25, p. 4]. Both methods require a number of quality controls, including demonstrations of capability, accuracy, and precision; analysis of blanks and surrogates; and determinations of MDLs for each analyte [Refs. 24, pp. 14–17; 25, pp. 16–19]. EPA defines MDL as the "lowest concentration of analyte that a method can detect reliably in either a sample or blank" [Ref. 1, p. 51586]. In all cases where PRASA presented an MDL (a.k.a. LOD) for PCE or cis-1,2-DCE, the value matched EPA's current CRQL of 0.50 µg/L for each compound [Refs. 5, pp. 1–2, 6, 9, 11, 14–26, 28–29, 31–35, 38–44; 26, p. 2; 26, p. 2].

EPA Sampling Event – Ground Water Samples: June 2006

EPA collected ground water samples from the available San German Urbano wells on June 20, 2006 [Refs. 9, pp. 5, 10, 11; 23, pp. 4–5]. The samples were analyzed for TCL and TAL parameters through the CLP. EPA was unable to collect a sample from the Retiro well because the pump had previously been removed [Ref. 9, p. 3]. Sample SG-GW01 was collected from the Lola I well and background sample SG-GW03 was collected from the El Real well [Refs. 9, pp. 5, 10, 11; 23, pp. 4–5]. In addition to the EPA data listed below, PCE was detected at an estimated concentration below the SQL in sample SG-GW02 collected from the Lola II well [Refs. 8, p. 21; 9, pp. 5, 10]. EPA validated the trace VOC data according to SOP HW-34 (Revision 0), "USEPA Region II Data Validation SOP for Statement of Work SOM01.1" [Ref. 8, pp. 2, 89–112]. Except for one compound unrelated to the site, EPA found the VOC data to be valid and acceptable, including meeting the CRQL requirements [Ref. 8, pp. 2, 17–40, 107].

Background Concentrations (Public Supply Wells)

PRASA Quarterly Sampling – Ground Water Samples: 2001 to 2005

Available PRASA water quality reports indicate that the El Real well was an active component of the San German Urbano water supply system from 2002 (earlier PRASA reports not available) through 2006, and that it was sampled regularly during that time, along with the other system wells [Ref. 31, pp. 3, 1 –12, 19, 26, 34–35]. Upon review of the quarterly ground water data for the period 2001 to 2005 at the PRASA laboratory in Caguas, Puerto Rico, EPA discovered that PCE, TCE, and cis-1,2-DCE were not detected in any samples from the El Real well during that time period [Ref. 5, p. 1]. EPA did not make copies of the El Real data sheets, but available data sheets for other wells during that time period show that PRASA matched the CRQL of 0.50 µg/L in all samples collected for quarterly monitoring [Refs. 5, pp. 1–2, 6, 9, 11, 14–26, 28–29, 31–35, 38–44; 26, p. 2; 30, pp. 2–5]. Based on these considerations, the quarterly samples collected from the El Real well from 2001 to 2005 demonstrate background concentrations of non-detect (ND) at an MDL of 0.50 µg/L for cis-1,2-DCE, PCE, and TCE. In addition, samples collected from the Retiro well from June 1994 to May 1995 show non-detect background concentrations before the well became contaminated, as shown below [Ref. 30, pp. 3–5].

Well Location	Screened Interval (ft AMSL)	Sample ID	Sample Date	Reference(s)
Retiro	126 to 52	94-054-6953	6/20/94	22, pp. 1, 3; 30, pp. 2–3
		95-054-1094	5/18/95	22, pp. 1, 3; 30, pp. 4–5

Sample ID	Hazardous Substance	Conc. (µg/L)*	MDL (µg/L)*	Reference(s)
94-054-6953	cis-1,2-DCE	ND	0.50	30, p. 3
	PCE	ND	0.50	
	TCE	ND	0.50	
95-054-1094	cis-1,2-DCE	ND	0.50	30, pp. 4–5
	PCE	ND	0.50	
	TCE	ND	0.50	

* PRASA presented its analyte concentrations and MDLs in mg/L. EPA has converted those values to µg/L for consistency with the EPA data presented in this report.

EPA Sampling Event – Ground Water Samples: June 2006

Well Location	Screened Interval (ft AMSL)	Sample ID	Sample Date	Reference(s)
El Real	98 to 68	SG-GW03 (B3RR6)	6/20/06	9, pp. 5, 10; 22, pp. 1, 3

Sample ID	Hazardous Substance	Conc. (µg/L)	SQL (µg/L)	Reference(s)
SG-GW03	cis-1,2-DCE	ND	0.50	8, p. 23; 9, p. 10
	PCE	ND	0.50	8, p. 24; 9, p. 10
	TCE	ND	0.50	8, p. 24; 9, p. 10

Contaminated Samples (Public Supply Wells)

PRASA Quarterly Sampling – Ground Water Samples: 2001 to 2005

Well Location	Screened Interval (ft AMSL)	Sample ID	Sample Date	Reference(s)
Lola I	132 to 32	01M0707	4/26/01	5, pp. 4, 9; 22, pp. 1, 4
		01-M-0721	4/26/01	5, p. 15
		02-M-0271	1/23/02	5, p. 16
		02-M-1987	7/23/02	5, p. 18
		02-M-2998	12/26/02	5, p. 21
		03-M-0214	1/24/03	5, p. 24
		03-M-1099	5/5/03	5, p. 25
		03M2679	9/25/03	5, p. 28
		03M2880	10/23/03	5, pp. 31–32
		03-M-2926	11/6/03	5, p. 34
		04M0831	5/12/04	5, p. 38
		04M1560	8/19/04	5, p. 40
Lola II	132 to 32	01-M-0708	4/26/01	5, p. 2; 22, p. 1
		01M0709	4/26/01	5, pp. 5–6
		02-M-0342	1/29/02	5, p. 17
		02-M-2999	12/26/02	5, p. 20
Retiro	126 to 52	01M0706	4/26/01	5, pp. 3, 11; 22, pp. 1, 3
		01-M-0720	4/26/01	5, p. 14
		02-M-2120	7/29/02	5, p. 19
		02-M-3000	12/26/02	5, p. 22
		03-M-0212	1/24/03	5, p. 23
		03-M-1798	6/29/03	5, p. 26
		03M2677	9/25/03	5, p. 29
		03M2881	10/23/03	5, p. 33
		04M0834	5/12/04	5, p. 35
		04M1562	8/19/04	5, p. 39
		633156	12/4/04	5, p. 41
		05-M-0288	3/11/05	5, p. 42
		05-M-0331	3/16/05	5, p. 43
		05M0965	7/10/05	5, p. 44

Contaminated Samples (Public Supply Wells) [continued]

PRASA Quarterly Sampling – Ground Water Samples: 2001 to 2005 (continued)

Well Location	Sample ID	Hazardous Substance	Conc. (µg/L)*	MDL (µg/L)*	Reference(s)
Lola I	01M0707	PCE	2.4	0.50	5, p. 9
	01-M-0721	cis-1,2-DCE	0.47	not listed	5, p. 15
		PCE	2.1	not listed	5, p. 15
	02-M-0271	cis-1,2-DCE	0.6	not listed	5, p. 16
		PCE	6.4	not listed	5, p. 16
	02-M-1987	PCE	1.7	not listed	5, p. 18
	02-M-2998	cis-1,2-DCE	0.5	0.50	5, p. 21
		PCE	4.2	0.50	5, p. 21
	03-M-0214	PCE	1.3	0.50	5, p. 24
	03-M-1099	PCE	1.1	0.50	5, p. 25
	03M2679	PCE	3.4	0.50	5, p. 28
	03M2880	cis-1,2-DCE	0.6	0.50	5, p. 31
		PCE	5.7	0.50	5, p. 32
	03-M-2926	cis-1,2-DCE	0.5	0.50	5, p. 34
		PCE	3.2	0.50	5, p. 34
	04M0831	PCE	1.4	0.50	5, p. 38
	04M1560	PCE	2.2	0.50	5, p. 40
Lola II	01-M-0708	PCE	2.5	not listed	5, p. 2
	01-M-0709	PCE	2.6	0.50	5, p. 6
	02-M-0342	cis-1,2-DCE	0.7	not listed	5, p. 17
		PCE	6.2	not listed	5, p. 17
	02-M-2999	PCE	4.2	0.50	5, p. 20
Retiro	01M0706	PCE	1.0	0.50	5, pp. 3, 11
	01-M-0720	PCE	0.8	not listed	5, p. 14
	02-M-2120	PCE	1.4	not listed	5, p. 19
	02-M-3000	PCE	1.0	0.50	5, p. 22
	03-M-0212	PCE	1.1	0.50	5, p. 23
	03-M-1798	cis-1,2-DCE	1.2	0.50	5, p. 26
		PCE	0.6	0.50	5, p. 26
	03M2677	PCE	0.9	0.50	5, p. 29
	03M2881	PCE	1.4	0.50	5, p. 33
	04M0834	PCE	1.7	0.50	5, p. 35
	04M1562	PCE	3.1	0.50	5, p. 39
	633156	PCE	5.0	0.50	5, p. 41
	05-M-0288	PCE	4.1	0.50	5, p. 42
	05-M-0331	PCE	4.0	0.50	5, p. 43
	05M0965	PCE	3.6	0.50	5, p. 44

* The MDL for both cis-1,2-DCE and PCE is thought to be 0.50 µg/L for all of the sample analyses, however, it was not listed as such on the laboratory report for all of the reporting dates.

Contaminated Samples (Public Supply Wells) [continued]

EPA Sampling Event – Ground Water Samples: June 2006

Well Location	Screened Interval (ft AMSL)	Sample ID	Sample Date	Reference(s)
Lola I	132 to 32	SG-GW01 (B3RR4)	6/20/06	9, pp. 5, 11; 22, pp. 1, 3

Sample ID	Hazardous Substance	Conc. (µg/L)	SQL (µg/L)	Reference(s)
SG-GW01	cis-1,2-DCE	1.5	0.50	8, p. 17; 9, p. 11
	PCE	1.6	0.50	8, p. 18; 9, p. 11
	TCE	0.54	0.50	8, p. 18; 9, p. 11

Attribution:

EPA has not yet identified a surface source of the ground water contaminants in the Lola I, Lola II, and Retiro wells. In July 2006, EPA conducted a reconnaissance effort at 44 sites within the municipality of San German as part of a Site Discovery Initiative to identify potential hazardous waste sites [Ref. 27, p. 1]. The reconnaissance identified two large facilities north of the contaminated wells that are regulated under RCRA. One is an inactive facility where contaminated soil and ground water are being remediated in accordance with a voluntary Interim Measure under the RCRA Corrective Action process. The other is an active pharmaceutical manufacturer regulated as a RCRA LQG [Ref. 27, pp. 11, 19, 31–32].

EPA also identified three other facilities as possible sources of the ground water contamination. In January 2007, EPA conducted a source investigation at the three facilities. The investigation included two PA/SIs and one ESI. The source investigations included the use of direct-push technology to complete soil borings at each of the facilities, and to collect surface and subsurface soil samples and ground water samples from the borings [Ref. 13, pp. 1–15]. Analytical results from the sampling event at the Wallace International facility indicated the presence of cis-1,2-DCE, PCE, and TCE in soil and ground water [Refs. 14, pp. 4–10, 13–14; 15, pp. 112–147, 205–264]. However, the Wallace facility is located approximately ½ mile from the contaminated wells with no ground water samples between the two areas, and there are other possible sources closer to the wells [Figure 1]. Analytical results from the sampling event at the Acorn Cleaners facility indicated the presence of PCE in one surface soil sample. However, PCE was detected in this sample at an estimated concentration below the SQL, so a source is not definitively identified [Refs. 16, pp. 4, 8; 17, p. 91]. In addition, PCE was not detected in ground water samples collected in association with the Acorn Cleaners site [Refs. 16, pp. 4–5; 17, pp. 35–46]. Chlorinated solvents were not detected in soil or ground water samples collected at the Abandoned Gulf Station facility [Refs. 18, pp. 3–5; 19, pp. 39–71, 81–98].

Based on the above considerations, the facilities identified during EPA's Site Discovery Initiative and sampling event are not identified as site sources. Descriptions of the five aforementioned facilities, including the results of the three source investigations, are provided on page 14 under "Other Possible Sources".

Hazardous Substances Released:

cis-1,2-Dichloroethylene (cis-1,2-DCE)	CAS No. 000156-59-2
Tetrachloroethylene (PCE)	CAS No. 000127-18-4
Trichloroethylene (TCE)	CAS No. 000079-01-6

Ground Water Observed Release Factor Value: 550

3.2 WASTE CHARACTERISTICS

3.2.1 Toxicity/Mobility

Hazardous Substance	Source Numbers	Toxicity Factor Value	Mobility Factor Value	Toxicity/ Mobility	Reference(s)
cis-1,2-Dichloroethylene	1, OR	100	1.0	100	2, p. 9
Tetrachloroethylene	1, OR	100	1.0	100	2, p. 14
Trichloroethylene	1, OR	10,000	1.0	10,000	2, p. 57

OR = Observed Release

Toxicity/Mobility Factor Value: 10,000

3.2.2 Hazardous Waste Quantity

Source Number	Source Hazardous Waste Quantity (HWQ) Value (Section 2.4.2.1.5)	Is source hazardous constituent quantity data complete? (yes/no)
1	>0	No

Sum of Values: >0 (rounded to nearest integer as specified in HRS Section 2.4.2.2)

The sum corresponds to a hazardous waste quantity factor value of 1 in Table 2-6 of the HRS [Ref. 1, p. 51591]. However, based on the fact that targets are subject to Level I concentrations (see Section 3.3.2.3 of this document), a hazardous waste quantity factor value of 100 can be assigned if it is greater than the hazardous waste quantity value from Table 2-6 (i.e., 1) [Ref. 1, p. 51592]. Therefore, a hazardous waste quantity factor value of 100 is assigned for the ground water pathway.

3.2.3 Waste Characteristics Factor Category Value

TCE corresponds to the toxicity/mobility factor value of 10,000, as shown previously (see Section 3.2.1).

Toxicity/Mobility Factor Value (10,000) x Hazardous
Waste Quantity Factor Value (100): 1×10^6

The product (1×10^6) corresponds to a Waste Characteristics Factor Category Value of 32 in Table 2-7 of the HRS [Ref. 1, p. 51592].

Hazardous Waste Quantity Factor Value: 100
Waste Characteristics Factor Category Value: 32

3.3 TARGETS

The Lola I, Lola II, and Retiro water system served an estimated population of 2,280 people and withdrew all of its water from those three public supply wells [Ref. 6, p. 2]. According to PRASA, the annual pumping output of each well for the year 2005 was as follows:

Well Name	Pumping Output (gallons)	Pumping Output (%)	Reference
Lola I	67,392,000	24%	6, pp. 1–2
Lola II	62,208,000	23%	6, pp. 1–2
Retiro	145,152,000	53%	6, pp. 1–2

Based on the recorded pumping rates, the system pumped a total of 274,752,000 gallons during 2005. Since the Retiro well provided more than 40 percent of the total system water supply, the population of 2,280 is apportioned in accordance with the total percentage of water each source pumped for distribution in 2005 [Refs. 1, p. 51603; 6, pp 1–4]. The apportioned populations and levels of contamination are presented below:

Well	Distance from Source (mi.)*	Population	Level I Contam. (Y/N)**	Level II Contam. (Y/N)**	Potential Contam. (Y/N)	Reference(s)
Lola I	0.07	547	Y	N	N	Fig. 1; Ref. 6, pp. 1–4
Lola II	0.05	525	Y	N	N	Fig. 1; Ref. 6, pp. 1–4
Retiro	0.07	1,208	Y	N	N	Fig. 1; Ref. 6, pp. 1–4

* Distance is measured from the center of the area of observed ground water contamination [Figure 1].

** Maximum Contaminant Level/Maximum Contaminant Level Goal (MCL/MCLG), Reference Dose Screen Concentration (RfD), and Cancer Risk Screen Concentration (CRSC) were used as benchmarks to evaluate the level of contamination [Ref. 1, p. 51593]. Applicable benchmarks for the contaminants detected in the observed release, presented here in µg/L for consistency with reported data, are as follows:

Substance	MCL/MCLG	RfD	CRSC	Reference(s)
cis-1,2-DCE	70	360	—	2, p. 24
PCE	5	360	1.6	2, p. 30
TCE	5	11	0.21	2, p. 57

See the next page for Level I concentrations detected in each well.

Level I Concentrations

Well	Sample	Substance	Conc. (µg/L)	Benchmark (µg/L)	Reference(s)
Lola I	01M0707	PCE	2.4	1.6 (CRSC)	2, p. 30; 5, p. 9
	01-M-0721	PCE	2.1	1.6 (CRSC)	2, p. 30; 5, p. 15
	02-M-0271	PCE	6.4	1.6 (CRSC)	2, p. 30; 5, p. 16
	02-M-1987	PCE	1.7	1.6 (CRSC)	2, p. 30; 5, p. 18
	02-M-2998	PCE	4.2	1.6 (CRSC)	2, p. 30; 5, p. 21
	03M2679	PCE	3.4	1.6 (CRSC)	2, p. 30; 5, p. 28
	03M2880	PCE	5.7	1.6 (CRSC)	2, p. 30; 5, p. 32
	03-M-2926	PCE	3.2	1.6 (CRSC)	2, p. 30; 5, p. 34
	04M1560	PCE	2.2	1.6 (CRSC)	2, p. 30; 5, p. 40
	SG-GW01	PCE	1.6	1.6 (CRSC)	2, p. 30; 8, p. 18
		TCE	0.54	0.21 (CRSC)	2, p. 57; 8, p. 18
Lola II	01-M-0708	PCE	2.5	1.6 (CRSC)	2, p. 30; 5, p. 2
	01-M-0709	PCE	2.6	1.6 (CRSC)	2, p. 30; 5, p. 6
	02-M-0342	PCE	6.2	1.6 (CRSC)	2, p. 30; 5, p. 17
	02-M-2999	PCE	4.2	1.6 (CRSC)	2, p. 30; 5, p. 20
Retiro	04M0834	PCE	1.7	1.6 (CRSC)	2, p. 30; 5, p. 35
	04M1562	PCE	3.1	1.6 (CRSC)	2, p. 30; 5, p. 39
	633156	PCE	5.0	1.6 (CRSC)	2, p. 30; 5, p. 41
	05-M-0288	PCE	4.1	1.6 (CRSC)	2, p. 30; 5, p. 42
	05-M-0331	PCE	4.0	1.6 (CRSC)	2, p. 30; 5, p. 43
	05M0965	PCE	3.6	1.6 (CRSC)	2, p. 30; 5, p. 44

3.3.1 Nearest Well

As identified in Section 3.3 of this document, the drinking water wells Lola I, Lola II, and Retiro are subject to Level I concentrations. Therefore, a nearest well factor value of 50 is assigned [Ref. 1, pp. 51602, 51603].

Nearest Well Factor Value: 50

3.3.2 Population

3.3.2.2 Level I Concentrations

As identified in Section 3.3 of this document, the drinking water wells Lola I, Lola II, and Retiro are considered Level I. The population assigned to each well is also explained in Section 3.3.

Level I Well	Population	Reference(s)
Lola I	547	6, pp. 1–4; 8, p. 18
Lola II	525	6, pp. 1–4; 5, p. 20
Retiro*	1,208	6, pp. 1–4; 7, pp. 2–6

Population Served by Level I Wells: 2,280 Level I Concentrations Factor Value: 22,800

* On January 17, 2006, the PRDOH ordered PRASA to close the Retiro well because of PCE concentrations exceeding the MCL of 5 µg/L [7, pp. 2–6)].

3.3.2.3 Level II Concentrations

The people served by contaminated drinking water wells (Lola I, Lola II, and Retiro) are already counted under the Level I concentrations factor. The Level II concentrations factor value is 0 because there are no other points of withdrawal subject to Level II concentrations [Ref. 1, p. 51603].

Level II Well	Population	Reference(s)
N/A	N/A	N/A

Population Served by Level II Wells: 0 Level II Concentrations Factor Value: 0

3.3.2.4 Potential Contamination

Due to the fact that the maximum score of 100.00 for the ground water pathway is achieved, potential contamination was not evaluated.

Potential Contamination Factor Value: 0

3.3.3 Resources

Available information does not indicate that ground water extracted from the aquifer of concern within the 4-mile radius of the site is used as a resource. Therefore, a resources factor value of 0 is assigned [Ref. 1, p. 51604; 21, p. 7].

Resources Factor Value: 0

3.3.4 Wellhead Protection Area

The Wellhead Protection Program for Puerto Rico was developed in accordance with Section 1428 of the Safe Drinking Water Act and approved by EPA in 1991 [Refs. 10, pp. 3–4; 11, p. 1]. Wellhead protection areas are defined by a fixed radius of 1,500 feet around each public supply well that does not withdraw water from the North Coast artesian limestone aquifer [Ref. 10, pp. 29–45]. The wells associated with the San German Ground Water Contamination site (i.e., Retiro, Lola I, and Lola II) are located in the southwest region of Puerto Rico, outside of the North Coast artesian limestone aquifer, so the 1,500-foot fixed radius is applicable for the public supply wells within the target distance limit of the site [Ref. 10, p. 34]. Based on this information, observed ground water contamination associated with the site lies within a designated wellhead protection area (i.e., at the contaminated public supply wells), and a wellhead protection area factor value of 20 is assigned [Ref. 1, p. 51604].

Wellhead Protection Area Factor Value: 20

REFERENCE 1

REFERENCE 1

federal register

Friday
December 14, 1990

Part II

Environmental Protection Agency

40 CFR Part 300

Hazard Ranking System; Final Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 300

[FRL-3730-8]

RIN 2050 AB73

Hazard Ranking System

AGENCY: Environmental Protection Agency.

ACTION: Final rule.

SUMMARY: The Environmental Protection Agency (EPA) is adopting revisions to the Hazard Ranking System (HRS), the principal mechanism for placing sites on the National Priorities List (NPL). The revisions change the way EPA evaluates potential threats to human health and the environment from hazardous waste sites and make the HRS more accurate in assessing relative potential risk. These revisions comply with other statutory requirements in the Superfund Amendments and Reauthorization Act of 1986 (SARA).

DATES: Effective date March 14, 1991. As discussed in Section III H of this preamble, comments are invited on the addition of specific benchmarks in the air and soil exposure pathways until January 14, 1991.

ADDRESSES: Documents related to this rulemaking are available at and comments on the specific benchmarks in the air and soil exposure pathways may be mailed to the CERCLA Docket Office, OS-245, U.S. Environmental Protection Agency, Waterside Mall, 401 M Street, SW, Washington, DC 20460, phone 202-382-3046. Please send four copies of comments. The docket is available for viewing by appointment only from 9:00 am to 4:00 pm, Monday through Friday, excluding Federal holidays. The docket number is 105NCP-HRS.

FOR FURTHER INFORMATION CONTACT: Steve Caldwell or Agnes Ortiz, Hazardous Site Evaluation Division, Office of Emergency and Remedial Response, OS-230, U.S. Environmental Protection Agency, 401 M Street, SW, Washington, DC 20460, or the Superfund Hotline at 800-424-9346 (in the Washington, DC area, 202-382-3000).

SUPPLEMENTARY INFORMATION:

Table of Contents

I. Background

In 1980, Congress enacted the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 U.S.C. 9601 *et seq.*), commonly called the Superfund, in response to the dangers posed by uncontrolled releases of hazardous substances, contaminants, and pollutants. To implement section 105(8)(A) of CERCLA and Executive Order 12316 (46 FR 42237, August 20, 1981), the U.S. Environmental Protection Agency (EPA) revised the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR part 300, on July 16, 1982 (47 FR 31180), with later revisions on September 16, 1985 (50 FR 37624), November 20, 1985 (50 FR 47912), and March 8, 1990 (55 FR 8666). The NCP sets forth guidelines and procedures for responding to releases or potential release of hazardous substances, pollutants, or contaminants.

Section 105(8)(A) of CERCLA (now section 105(a)(8)(A)) requires EPA to establish:

> Criteria for determining priorities among releases or threatened releases [of hazardous substances] throughout the United States for the purpose of taking remedial action and, to the extent practicable taking into account the potential urgency of such action, for the purpose of taking removal action. Criteria and priorities * * * shall be based upon the relative risk or danger to public health or welfare or the environment * * * taking into account to the extent possible the population at risk, the hazard potential of the hazardous substances at such facilities, the potential for contamination of drinking water supplies, the potential for direct human contact, [and] the potential for destruction of sensitive ecosystems * * *.

To meet this requirement and help set priorities, EPA adopted the Hazard Ranking System (HRS) as appendix A to the NCP (47 FR 31180, July 16, 1982). The HRS is a scoring system used to assess the relative threat associated with actual or potential releases of hazardous substances at sites. The HRS is the primary way of determining whether a site is to be included on the National Priorities List (NPL), the Agency's list of sites that are priorities for long-term evaluation and remedial response, and is a crucial part of the Agency's program to address the identification of actual and potential releases. (Each State can nominate one site to the NPL as a State top priority regardless of its HRS score; sites may also be added in response to a health advisory from the Agency for Toxic Substances and Disease Registry (see NCP, 40 CFR 300.425(c)(3)).) Under the original HRS, a score was determined for a site by evaluating three migration pathways—ground water, surface water, and air. Direct contact and fire and explosion threats were also evaluated to determine the need for emergency actions, but did not enter into the decision on whether to place a site on the NPL.

In 1986, Congress enacted the Superfund Amendments and Reauthorization Act of 1986 (SARA) (Pub. L. 99-499), which added section 105(c)(1) to CERCLA, requiring EPA to amend the HRS to assure "to the maximum extent feasible, that the hazard ranking system accurately assesses the relative degree of risk to human health and the environment posed by sites and facilities subject to review." Congress, in its Conference Report on SARA, stated the substantive standard against which HRS revisions could be assessed:

> This standard is to be applied within the context of the purpose for the National Priorities List: i.e., identifying for the States and the public those facilities and sites which appear to warrant remedial actions. * * * This standard does not, however, require the Hazard Ranking System to be equivalent to detailed risk assessments, quantitative or qualitative, such as might be performed as part of remedial actions. The standard requires the Hazard Ranking System to rank sites as accurately as the Agency believes is feasible using information from preliminary assessments and site inspections * * * Meeting this standard does not require long-term monitoring or an accurate determination of the full nature and extent of contamination at sites or the projected levels of exposure such as might be done during remedial investigations and feasibility studies. This provision is intended to ensure that the Hazard Ranking System performs with a degree of accuracy appropriate to its role in expeditiously identifying candidates for response actions. [H.R. Rep. No. 962, 99th Cong., 2nd Sess. at 199-200 (1986)]

Section 105(c)(2) further specifies that the HRS appropriately assess the human health risks associated with actual or potential contamination of surface waters used for recreation or drinking water and that this assessment should take into account the potential migration of any hazardous substance through surface water to downstream sources of drinking water.

SARA added two criteria for evaluating sites under section 105(a)(8)(A): Actual or potential contamination of the ambient air and threats through the human food chain. In addition, CERCLA section 118, added by SARA, requires EPA to give a high priority to facilities where the release of hazardous substances has resulted in the closing of drinking water wells or has contaminated a principal drinking water supply. Finally, CERCLA section 125, added by SARA, requires revisions to the HRS to address facilities that contain substantial volumes of wastes specified in section 3001(b)(3)(A)(i) of the Solid Waste Disposal Act, commonly referred to as the Resource Conservation and Recovery Act (RCRA). These wastes include fly ash wastes, bottom ash wastes, slag wastes, and flue gas emission control wastes generated primarily from the combustion of coal or other fossil fuels. Specifically, section 125 requires EPA to revise the HRS to assure the appropriate consideration of each of the following site-specific characteristics of such facilities:

- The quantity, toxicity, and concentrations of hazardous constituents that are present in such waste and a comparison with other wastes;
- The extent of, and potential for, release of such hazardous constituents into the environment; and
- The degree of risk to human health and the environment posed by such constituents.

EPA published an advance notice of proposed rulemaking (ANPRM) on April 9, 1987 (52 FR 11513), announcing its intention to revise the HRS and requesting comments on a number of issues. After a comprehensive review of the original HRS, including consideration of alternative models and Science Advisory Board review, EPA published a notice of proposed rulemaking (NPRM) for HRS revisions on December 23, 1988 (53 FR 51962). The NPRM contains a detailed preamble, which should be consulted for a more extensive discussion of CERCLA, SARA, the HRS, and the proposed changes to the HRS.

Today, EPA is publishing the revised HRS, which will supersede the HRS previously in effect as appendix A to the NCP. CERCLA section 105(c)(1) states that the revised HRS shall be applied to any site newly listed on the NPL after its effective date; as specified in section 105(c)(3), sites scored with the original HRS prior to that effective date need not be reevaluated.

The HRS is a scoring system based on factors grouped into three factor categories. The factor categories are multiplied and then normalized to 100 points to obtain a pathway score (e.g., the ground water migration pathway score). The final HRS score is obtained by combining the pathway scores using a root-mean-square method. The proposed HRS revised every factor to some extent. A few factors were replaced, and several new factors were added. The major proposed changes included:

(1) Consideration of potential as well as actual releases to air;
(2) Addition of mobility factors;
(3) Addition of dilution and distance weightings for the water migration pathways and modification of distance weighting in the air migration pathway;
(4) Revisions to the toxicity factor;
(5) Additions to the list of covered sensitive environments;
(6) Addition of human food chain and recreation threats to the surface water migration pathway;
(7) Revision of the hazardous waste quantity factor to allow a tiered approach;
(8) Addition of health-based benchmarks for evaluating population factors and ecological-based benchmarks for evaluating sensitive environments;
(9) Addition of factors for evaluating the maximally exposed individual; and
(10) Inclusion of a new onsite exposure pathway.

EPA conducted a field test of the proposed HRS to assess the feasibility of implementing the proposed HRS factors, to determine resources required for specific tasks, to assess the availability of information needed for evaluation of sites, and to identify difficulties with the use of the proposed revisions. To meet the objectives, site inspections were performed at 29 sites nationwide. The sites were selected either because work was already planned at the site or because the sites had specific features EPA wanted to test using the proposed revisions to the HRS. The major results of the field test were summarized on September 14, 1989 (54 FR 37949), when the field test report was made available for public review and comment.

II. Overview of the Final Rule

The rule being promulgated today incorporates substantial changes to revisions proposed in December 1988. EPA has changed the rule for three reasons: (1) To respond to the general comment submitted by many commenters that the factor categories and pathways need to be consistent with each other; (2) to respond to specific recommendations made by commenters; and (3) to respond to problems identified during the field test and discussed in the field test report. Major changes affecting multiple pathways include:

- Multiplication of hazardous waste quantity factor, toxicity, and other waste characteristics factors;
- Uncapping of population factors (i.e., no limit is placed on maximum value);
- Revised criteria for establishing an observed release;
- Capping of potential to release at a value less than observed release;
- Revision of the toxicity evaluation to select carcinogenic and non-cancer chronic values in preference to acute toxicity values;
- Elimination of Level III concentrations and extension of weighting based on levels of exposure to nearest individual (well/intake; formerly maximally exposed individual) factors;
- Modification of the weights assigned to Level I and Level II concentrations;
- Revisions to the benchmarks used and methods for determining exceedance of benchmarks;
- Use of ranges to assign values for potentially exposed populations;
- Inclusion of factors assessing exposures of the nearest individual in all pathways;
- Revisions to distance and dilution weights in all pathways except ground water migration;
- Replacement of the use factors with less heavily weighted resources factors;
- Evaluation of wetlands based on size or surface water frontage; and
- Specific instructions for the evaluation of radionuclides at radioactive waste sites and sites with radioactive and other hazardous substances wastes.

The major changes in the ground water migration pathway include:

- Replacement of depth to aquifer/hydraulic conductivity and sorptive capacity factors with travel time and depth to aquifer factors; and
- Revision of the mobility factor, including consideration of distribution coefficients.

In the surface water migration pathways, the major changes include:

- Elimination of the separate recreational use threat;
- Addition of a ground water to surface water component;

• Incorporation of bioaccumulation into the waste characteristics factor category rather than the targets factor category for the human food chain threat;

• Revision to allow use of additional tissue samples in establishing Level I concentrations for the human food chain threat; and

• Addition of ecosystem bioaccumulation potential factor for sensitive environments.

The major changes in the soil exposure pathway (formerly the onsite exposure pathway) include:

• Elimination of separate consideration of the high risk population;

• Inclusion of hazardous waste quantity in the waste characteristics factor category;

• Consideration of workers in the resident threat's targets factor category; and

• Revisions to scoring of terrestrial sensitive environments.

The major changes in the air migration pathway include:

• Separate evaluation of gas and particulate potential to release; and

• Consideration of actual contamination in evaluating sensitive environments.

Figures 1 to 4 show the differences between the pathways in the original HRS and in the final rule.

BILLING CODE 6560-50-M

Figure 1

Ground Water Migration Pathway

ORIGINAL HRS

Likelihood of Release X	Waste Characteristics X	Targets
Observed Release or Route Characteristics Depth to Aquifer of Concern Net Precipitation Permeability of Unsaturated Zone Physical State Containment	Toxicity/Persistence Hazardous Waste Quantity	Ground Water Use Distance to Nearest Well/ Population Served

FINAL HRS

Likelihood of Release X	Waste Characteristics X	Targets
Observed Release or Potential to Release Containment Net Precipitation Depth to Aquifer Travel Time	Toxicity/Mobility Hazardous Waste Quantity	Nearest Well Population Resources Wellhead Protection Area

Figure 2

Surface Water Migration Pathway

ORIGINAL HRS

Likelihood of Release **Observed Release** **or** **Route Characteristics** **Facility Slope/Intervening Terrain** **1-Year, 24-Hour Rainfall** **Distance to Nearest Surface Water** **Physical State** **Containment**	**X**	**Waste Characteristics** **Toxicity/Persistence** **Hazardous Waste Quantity**	**X**	**Targets** **Surface Water Use** **Distance to Sensitive Environment** **Population Served/Distance to Nearest Intake Downstream**

Figure 2

Surface Water Migration Pathway (continued)

FINAL HRS

Likelihood of Release:
Overland Flow/Flood Component

Observed Release
or
Potential to Release

By Overland Flow
- Containment
- Runoff
- Distance to Surface Water

By Flood
- Containment
- Flood Frequency

or

Likelihood of Release:
Ground Water to Surface Water Component

Observed Release
or
Potential to Release
- Containment
- Net Precipitation
- Depth to Aquifer
- Travel Time

X

Drinking Water Threat

Waste Characteristics	x	Targets
Toxicity/Mobility[1]/Persistence		Nearest Intake
Hazardous Waste Quantity		Population
		Resources

+

Human Food Chain Threat

Waste Characteristics	x	Targets
Toxicity/Mobility[1]/ Persistence/Bioaccumulation		Food Chain Individual
Hazardous Waste Quantity		Population

+

Environmental Threat

Waste Characteristics	x	Targets
Ecosystem Toxicity/Mobility[1]/ Persistence/Bioaccumulation		Sensitive Environments
Hazardous Waste Quantity		

[1] Mobility is only applicable to the Ground Water to Surface Water Component.

Figure 3

Soil Exposure Pathway[1]

FINAL HRS

Resident Population Threat

Likelihood of Exposure	X	Waste Characteristics	X	Targets
Observed Contamination		Toxicity Hazardous Waste Quantity		Resident Individual Resident Population Workers Resources Terrestrial Sensitive Environments

+

Nearby Population Threat

Likelihood of Exposure	X	Waste Characteristics	X	Targets
Attractiveness/Accessibility Area of Contamination		Toxicity Hazardous Waste Quantity		Population Within 1 Mile Nearby Individual

[1] New pathway.

Figure 4

Air Migration Pathway

ORIGINAL HRS

Likelihood of Release	X	Waste Characteristics	X	Targets
Observed Release		Reactivity and Incompatibility Toxicity Hazardous Waste Quantity		Population Within 4-Mile Radius Distance to Sensitive Environment Land Use

FINAL HRS

Likelihood of Release	X	Waste Characteristics	X	Targets
Observed Release or Potential to Release Gas Gas Containment Gas Source Type Gas Migration Potential Particulate Particulate Containment Particulate Source Type Particulate Migration Potential		Toxicity/Mobility Hazardous Waste Quantity		Nearest Individual Population Resources Sensitive Environments

BILLING CODE 6560-50-C

Section III of this preamble summarizes and responds to major issues raised by commenters. These issues are organized so that issues that affect multiple pathways are covered first, followed by discussions of individual pathway issues. Section IV provides a section-by-section discussion of the final rule. All substantive changes not discussed in section III are identified in section IV. Because the rule has been substantially rewritten to clarify the requirements, editorial changes are not generally noted.

III. Discussion of Comments

About 100 groups and individuals submitted comments on the ANPRM and NPRM. Nineteen of these also submitted comments on the field test report; two other groups submitted comments only on the field test report. The commenters included more than 20 State agencies, several Federal agencies, companies, trade associations, Indian tribes, environmental groups, technical consultants, and individuals. This section summarizes and responds to the major issues raised by commenters. A description of the comments and EPA's response to each issue raised in the comments are available in *Responses to Comments on Revisions to the Hazard Ranking System (HRS)* in the EPA CERCLA docket (see ADDRESSES section above).

A. Simplification

In response to SARA, EPA proposed revisions to the HRS so that, to the maximum extent feasible, it accurately assesses the relative risks posed by hazardous waste sites to human health and the environment. Consequently, the proposed rule required more data than did the original HRS.

A number of commenters stated that the data collection requirements of the proposed rule were excessive given its purpose as a screening tool. These commenters expressed concern that the data requirements were too extensive for a screening process; specifically, that the data requirements would lengthen the time needed to score sites with the HRS, increase the cost of listing sites, and, therefore, limit the money available for remedial actions. Most commenters—even those who considered that the revisions increased the accuracy of the model—stated that the resources required to evaluate sites under the proposed HRS were excessive.

One commenter suggested the proposed HRS would be so expensive to implement that EPA would need to develop a new screening tool to determine whether a site should undergo an HRS evaluation. Another commenter suggested that because of the complexity of the proposed revisions, preliminary scoring of a site during the site assessment process would be impractical because sites would advance too far in the site assessment process before they were determined not to be NPL candidates. Several commenters stated that, with the additional requirements, the proposed HRS is more of a quantitative risk-assessment tool than the screening tool it is supposed to be. Another suggested that the increased accuracy of the proposed rule over the original HRS is of marginal value relative to the amount of time and money involved, and that the HRS is no longer a quick and inexpensive method of assessing relative risks associated with sites.

Several commenters expressed concern that the increased data requirements of the proposed HRS would affect the schedule of the entire site assessment process. They suggested that these requirements would create a backlog of sites to be evaluated, slow the process of listing sites, and delay cleanup. Some noted that this would be contrary to the goal of identifying and evaluating sites expeditiously.

In response, the Agency believes the requirements of the final rule are within the scope of the site assessment process and that a new screening tool to determine whether a site should undergo an HRS evaluation will not be needed. To assist in screening sites, the site assessment process is divided into two stages:

- A preliminary assessment (PA), which focuses on a visual inspection, collection of available local, State, and Federal permitting data, site-specific information (e.g., topography, population), and historical industrial activity; and
- A site inspection (SI), where PA data are augmented by additional data collection, including sampling of appropriate environmental media and wastes, to determine the likelihood of a site receiving a high enough HRS score to be considered for the NPL.

The field test identified a best estimate of the average and range of costs incurred to support the data requirements of the proposed HRS. These cost estimates represented the entire site assessment process from PA to SI, and comprehensive evaluations for all pathways at most sites. As such, the Agency believes these cost estimates overstate the costs associated with site assessments occurring on the greater universe of CERCLA sites. The amount of data collected during an SI varies from site to site depending on the complexity of the site and the number of environmental media believed to be contaminated. Some SIs may be limited in scope if data are easy to obtain, while others require more substantial resource commitments. The most important factors in determining costliness of an SI are (1) the presence or absence of ground water monitoring wells in situations where ground water is affected, and (2) the number of affected media, which determines the number of samples taken and analyzed. The Agency believes the greater universe of CERCLA sites will not require the more substantial resource commitments.

Finally, EPA does not agree that the requirements of the final rule will delay the listing of sites. The site assessment process screens sites at each stage, thereby limiting the number of sites that require evaluation for scoring. The Agency believes that it will be possible to score sites expeditiously with the revised HRS.

The Agency believes the additional data requirements of the final rule will make it more accurately reflect the relative risks posed by sites, but also that the HRS should be as simple as possible to make it easier to implement and to retain its usefulness as a screening device. This approach responds to the majority of commenters who recommended that EPA simplify the proposed HRS to make it easier and less expensive to implement. In response to these comments, the rule adopted today includes a number of changes from the proposed rule that simplify the HRS. These simplifying changes were based largely on EPA's field test of the proposed rule, sensitivity studies, and issue analyses undertaken by EPA in response to comments.

- In the surface water migration pathway, the proposed recreation threat has been eliminated as a separate threat. Instead of requiring a separate set of detailed calculations and data, the final rule accounts for recreational use exposures through resources factors, where points may be added for recreation use.
- In the ground water migration pathway, the proposed potential to release has been simplified by dropping "sorptive capacity," by revising "depth to aquifer" and making it a separate factor, and by eliminating the requirement to consider all geological layers between the hazardous substance and the aquifer in evaluating travel time to the aquifer. The "travel time" factor (the depth to aquifer/hydraulic conductivity factor in the proposed rule)

is now based on the layer(s) with the lowest hydraulic conductivity.

- In the three migration pathways (i.e., ground water, surface water, and air), the use factors in the proposed rule—"land use" in the air migration pathway, "drinking water use" and "other water use" in the ground water migration pathway, and "drinking water use" and "other water use" in the surface water migration pathway—have been replaced by "resources" factors. The "fishery use" factor has been dropped from the surface water migration pathway. A resources factor has been added to the soil exposure pathway.
- In the soil exposure pathway, the requirement that children under seven be counted as a separate population has been dropped. The "accessibility/frequency of use" factor has been replaced by a simpler "attractiveness/accessibility" factor.
- In the surface water migration pathway, the "runoff curve number," which required determining the predominant land use within the drainage area, has been replaced by a simpler factor, "soil group," which only requires classifying the predominant soil group in the drainage area into one of four categories.
- In the air migration pathway, the maps used to assign values of particulate migration potential (formerly particulate mobility under potential to release) have been simplified.
- In all pathways, potentially exposed populations are assigned values based on ranges rather than exact counts, reducing documentation requirements.
- In the surface water and ground water migration pathways, Level III benchmarks have been dropped.
- In all pathways, hazardous waste quantity values are based on ranges, which will reduce documentation requirements. The methodology and explanation for evaluating the hazardous waste quantity factor have been simplified.
- Containment tables have been simplified in the air, ground water, and surface water migration pathways.

A number of the simplifications, such as the changes to the travel time and hazardous waste quantity factors, better reflect the uncertainty of the underlying site data and, therefore, do not generally affect the accuracy of the HRS. In addition, EPA notes that some revisions that may appear to make the HRS more complex actually make it more flexible. For example, the hierarchy for determining hazardous waste quantity allows using data on the quantity of hazardous constituents if they are available or can be determined; additionally, data on the quantity of hazardous wastestreams, source volume, and source area can be used, depending on the completeness of data within the hierarchy. The hierarchy allows a site to be scored at the most precise level for which data are reasonably available, but does not require extensive data collection where available data are less precise.

In response to comments on the complexity of the rule language, the presentation of the HRS has been reorganized and clarified. Factors that are evaluated in more than one pathway are explained in a separate section of the final rule (§ 2) to eliminate the repetition of instructions. The proposed HRS included descriptive background material that, while useful, made the HRS difficult to read. Much of this descriptive material has been removed from the rule.

B. HRS Structure Issues

Although the proposed rule retained the basic structure of the original HRS, a number of commenters felt that the HRS should provide results consistent with the results of a quantitative risk assessment. Several commenters identified this issue explicitly, while others identified specific aspects of the proposed rule that they believed to be inconsistent with basic risk assessment principles. The commenters maintained that if the HRS is to reflect relative risks to the extent feasible, as required by the statute, its structure should be modified to better reflect the methods employed in quantitative risk assessments. Commenters stressed the need for EPA to follow the advice of the EPA Science Advisory Board (SAB) as expressed in the SAB review of the HRS:

> Revisions to the HRS should begin with the development of a chain of logic, without regard for the ease or difficulty of collecting data, that would lead to a risk assessment for each site. This framework, but not the underlying logic, would be simplified to account for the very real difficulties of data collection.
>
> This chain of logic * * * should lead to a situation in which an increased score reflects an increased risk presented by a site.

In response to the structural issues raised by commenters and to the statutory mandate to reflect relative risk to the extent feasible, EPA made a number of changes to the final rule. These structural changes affect how various factors are scored and how scores are combined, but do not involve changes in the types or amount of data required to score a site with the HRS. The Agency stresses that the limited data generated at the SI stage are designed to support site screening, and are not intended to provide support for a quantitative risk assessment.

General structural changes. While the final rule retains the basic structure of the proposed rule in that three factor categories (likelihood of release, waste characteristics, and targets) continue to be multiplied together to obtain pathway scores, the structure has been changed in certain respects to make the underlying logic of the HRS more consistent with risk assessment principles.

The key structural changes to the waste characteristics factor category were to make use of consistent scales and to multiply the hazardous waste quantity and toxicity (or, depending on the pathway and threat, toxicity/mobility, toxicity/persistence, or toxicity/persistence/bioaccumulation) factors. Within the waste characteristics factor category, factors have been modified so they are on linear scales. These modifications make the functional relationships between the HRS factors more consistent with the toxicity and exposure parameters evaluated in risk assessments.

Where possible, the final rule assigns similar maximum point values to factor categories across pathways. The likelihood of release (likelihood of exposure) factor category is assigned a maximum value of 550; the waste characteristics factor category is assigned a maximum value of 100 (except for the human food chain and environmental threats of the surface water migration pathway); the targets factor category is not assigned a maximum. EPA determined that in general targets should be a key determinant of site threat because the data on which the targets factors are based are relatively more reliable than most other data available at the SI stage.

Likelihood of release. Except in the air migration pathway, the proposed rule assigned the same maximum value to observed release and potential to release. In the final rule, an observed release is assigned a value of 550 points and potential to release has a maximum value of 500 in all pathways. This relative weighting of values reflects the greater confidence (the association of risks with targets) when reporting an observed release as opposed to a potential release. As a result of this change in point values at the factor category level, as well as the new maximums for most pathways, the values assigned to individual potential to release factors have been adjusted.

Waste characteristics. The proposed rule assigned a maximum point value to hazardous substance quantities of 1,000 pounds. Because some sites have hazardous substance quantities far in excess of that amount and because it is reasonable to assume that these sites present some additional risk, all else being equal, the final rule elevates the maximum value to quantities in excess of 1,000,000 pounds. Even when hazardous waste quantity is documented with precision, EPA concluded that there are diminishing returns in considering quantities above this amount.

Although the HRS does not employ the same type and quality of information that would be used to support a risk assessment (e.g., pounds of waste and mobility are combined in the ground water pathway as a surrogate for long-term magnitude of releases), as waste characteristics values rise, contamination resulting from conditions at the sites in general should be worse. As a result of using linear scales and incorporation of a multiplicative relationship between hazardous waste quantity, toxicity, and other waste characteristics factors, the influence of the waste characteristics factor category could be disproportionately large relative to the likelihood of release and targets factor categories in determining overall pathway scores. Therefore, EPA is limiting—through use of a scale transformation—the values assigned to the waste characteristics factor category, shown in Table 2-7 of the final HRS, to limit the effect of waste characteristics on the pathway scores.

While the waste characteristics factor values are limited to values of 0 to 100 in most cases, the waste characteristics factor category may reach values of up to 1,000 for both the human food chain and environmental threats in the surface water migration pathway. These exceptions have been made to accommodate the bioaccumulation factor (or ecosystem bioaccumulation factor), applied in these threats but not in other pathways or threats, which can add up to four orders of magnitude to the waste characteristics factor values before reduction to the scale values of 0 to 1,000.

Targets. The final rule includes two major structural changes to the targets factor category. Population factor values are not capped as they were in the proposed rule. This change allows a site with a large population but a low waste characteristics value to receive scores similar to a site with a smaller population but larger waste characteristics value (as would be done in a risk assessment). A second change in the targets factors involves the nearest individual (or intake or well) factors (i.e., the maximally exposed individual factors in the proposed rule). These factors are now assigned values based on exposure to Level I and Level II contamination (50 and 45 points, respectively). Potentially exposed nearest individuals are assigned a maximum of 20 points in all pathways. EPA changed the assigned values for these factors to give more relative weight to individuals that are exposed to documented contamination.

C. Hazardous Waste Quantity

In the NPRM, EPA proposed to change the hazardous waste quantity factor to allow the use of four levels of data depending on what data are available and how complete they are. Hazardous waste quantity for a source could be based on (a) hazardous constituent quantity, (b) the total quantity of hazardous wastes in the source, (c) the volume of the source, or (d) the area of the source. Each source at the site would be evaluated separately, based on data available for the source.

EPA received numerous comments relating to changes in the hazardous waste quantity factor. Several commenters agreed that allowing use of waste constituent data, when available, was an improvement over the original HRS. Several also supported the tiered approach to scoring hazardous waste quantity when constituent data were incomplete or unavailable.

Two commenters stated that the emphasis on hazardous constituent data will require more extensive and expensive site investigations. These commenters have misunderstood the revisions. The rule does not require the scorer to determine hazardous constituent quantities in all instances, but simply encourages use of those data when they are available. This approach allows a scorer the flexibility to use different types of available data for scoring hazardous waste quantity. At a minimum, the scorer need only determine the area of a source (or the area of observed contamination), which is routinely done in site inspections. Where better data are available, they may be used in scoring the factor. This approach is in keeping with the intent of Congress that the HRS should act as a screening tool for identifying sites warranting further investigation.

Several commenters stated that the methodology for determining hazardous waste quantity was too complex and time consuming, and that its administrative costs outweighed its benefits. Others found the proposed rule instructions and tables confusing and hard to follow.

EPA strongly disagrees with the claim that the costs of the revised approach to scoring waste quantity outweigh its benefits. The amount of hazardous substances present at a site is an important indicator of the potential threat the site poses. At the same time, EPA recognizes that cost is an important consideration. In revising the hazardous waste quantity factor, however, the Agency believes it has established an appropriate balance between time and cost required for scoring this factor and the degree of accuracy needed to evaluate the relative risk of the site properly.

In response to comments, EPA has modified the hazardous waste quantity scoring methodology to make it easier to understand and to use. The changes include elimination of proposed rule Table 2-13, Hazardous Waste Quantity Factor Evaluation Methodology and Worksheet. In addition, the scale for the hazardous waste quantity factor has been divided into ranges that span two orders of magnitude (100x) to reflect the uncertainty inherent in estimates of hazardous waste quantities at typical sites. The practical effect of this scale change is to reduce the data collection and documentation requirements. See §§ 2.4.2–2.4.2.2. The final rule also clarifies the treatment of wastes classified as hazardous under RCRA. Under CERCLA, any RCRA hazardous waste stream is considered a hazardous substance. If this definition were strictly applied in evaluating hazardous waste quantity of RCRA hazardous wastestreams, hazardous constituent quantity and hazardous wastestream quantity would be the same because the entire wastestream would be considered a hazardous substance. The final rule makes clear that only the constituents in a RCRA wastestream that are CERCLA hazardous substances should be evaluated for determining hazardous constituent quantity; for the other three tiers, however, the entire RCRA wastestream is considered as is any other wastestream.

As discussed in section III Q, EPA will consider removal actions when calculating waste quantities. EPA believes consideration of removal actions is likely to increase incentives for rapid actions. If there has been a removal at a site, and the hazardous constituent quantity for all sources and associated releases is adequately determined, the hazardous waste quantity factor value will be based only on the amount remaining after the removal. This will result in lowering some hazardous waste quantity factor values.

Where an adequate determination of the hazardous constituent quantity remaining after the removal cannot be made, EPA has established minimum hazardous waste quantity factor values in order to ensure that the HRS score reflects any continuing risks at the sites. In this case, the assigned hazardous waste quantity factor value will be the current hazardous waste quantity factor value (as derived in Table 2-6), or the minimum value, whichever is greater.

The proposed rule assigned a minimum hazardous waste quantity factor value of 10 when data on hazardous constituent quantity was not complete. In the final rule, for migration pathways (i.e., not the soil exposure pathway), if the hazardous constituent quantity is not adequately determined, and if any target is subject to Level I or II contamination, the minimum hazardous waste quantity factor value will be 100.

If the hazardous constituent quantity for all sources is not adequately determined, and none of the targets are subject to Level I or II contamination, the minimum factor value assigned for hazardous waste quantity depends on whether there has been a removal action, and what the hazardous waste quantity factor value would have been without consideration of the removal action. If there has not been a removal action, the minimum hazardous waste quantity factor value will be 10. If there has been a removal action and if a factor value of 100 or greater would have been assigned without consideration of the removal action, a minimum hazardous waste quantity factor value of 100 will be assigned. If the hazardous waste quantity factor value was less than 100 prior to consideration of the removal action, a minimum hazardous waste quantity factor value of 10 will be assigned. This will ensure that the Agency provides an incentive for removal actions and that in no case will consideration of removal actions result in an increased hazardous waste quantity factor value score.

D. Toxicity

The proposed HRS substantially changed the basis for evaluating toxicity. The major change was that hazardous substance toxicity would be based on carcinogenicity, chronic non-cancer toxicity, and acute toxicity. For each migration pathway and each surface water threat except human food chain and recreation, toxicity was combined with mobility or persistence factors to select the hazardous substance with the highest combined value for toxicity and the applicable mobility or persistence factor. For the human food chain threat, only substances with the highest bioaccumulation values were evaluated for toxicity/persistence. For the recreation threat, only substances with the highest dose adjusting factor values were evaluated for toxicity/persistence. In addition, ecosystem toxicity rather than human toxicity was evaluated for the environmental threat of the surface water migration pathway.

Several commenters expressed concern about or opposition to using the single most hazardous substance at a site to score toxicity, stating that the approach seems overly conservative and unlikely to distinguish sites on the basis of hazard. Some commenters suggested that EPA allow flexibility in weighting the toxicity values of multiple substances either by concentration, waste quantity, or proportion information, whenever such information is available. One commenter suggested basing toxicity on a fixed percentage of the hazardous substances known to be present at a site.

The Agency agrees that, for purposes of accurately assessing the risk to human health and the environment posed by a site, it would be preferable to evaluate the overall toxicity by considering all hazardous substances present, based on some type of dose- (or concentration-) weighted toxicity approach. EPA believes, however, that this approach is not feasible because the data requirements would be excessive. Such an approach would be feasible only when relative exposure levels of multiple substances are known or can reasonably be estimated; however, these data can be obtained only by conducting a comprehensive risk assessment. Extensive concentration data would be required to be confident that comparable concentrations are being used for the various substances, and that the multi-substance toxicity of the contaminants is not, in fact, being underestimated. Use of inadequate data could result in underestimating or overestimating the toxicity of substances in a pathway.

EPA considered a number of alternatives to the use of a single hazardous substance to score toxicity (mobility/persistence) and tested some of these on several real and hypothetical sites. The analyses included comparisons between the single most toxic substance and the average toxicity value for all substances, the average toxicity value for the 10 most toxic substances, and the concentration-weighted average value of all substances. These alternatives were also tested using toxicity/mobility values. The results of these analyses showed that using a single substance approach usually resulted in an assigned value (either toxicity or toxicity/mobility) that was within one interval in the scale of values of the alternatives tested; for example, the single substance approach would assign a value of 1,000 for toxicity whereas averaging the toxicities would assign a value of 1,000 or 100, the next lower scale value. (The final rule uses linear scales to assign values for toxicity, mobility, and persistence. The scales for toxicity now range from 0 to 10,000 rather than 0 to 5; consequently, the default value for toxicity is now 100 rather than 2.) The Agency recognizes the uncertainty in the use of the single substance approach, but concludes that it is a reasonable approach for a screening model, especially given the general unavailability of information to support alternatives. In making this judgment, the Agency notes that the single substance approach to evaluating the toxicity factor was not identified in SARA as a portion of the HRS requiring further examination, even though it had been used in the original HRS and EPA had received criticism similar to the above comments prior to the enactment of SARA.

Several commenters suggested that additive, synergistic, or antagonistic effects among substances be considered in scoring toxicity when several substances are found at a site. In particular, one commenter suggested increasing the scores for sites with a large number of hazardous substances to account for additive or synergistic effects.

As noted in EPA's 1988 *Technical Support Document for the Proposed Revisions to the Hazard Ranking System*, quantitative consideration of synergistic/antagonistic effects between hazardous substances is generally not possible even in RI/FS risk assessments because appropriate data are lacking for most combinations of substances. Interactive effects have been documented for only a few substance mixtures, and the Agency's risk assessment guidelines for mixtures (51 FR 34014, September 24, 1986) emphasize that although additivity is a theoretically sound concept, it is best applied for assessing mixtures of similar acting components that do not interact. Thus, the Agency believes that consideration of interactive effects in evaluating toxicity in the HRS is not feasible, nor is it necessary to allow use of the HRS as a screening model. The Agency rejects the suggestion that scores should simply be raised for sites with numerous substances because this approach ignores the technical complexities related to interactions (i.e., the possibility of antagonistic effects.)

One commenter suggested that a waste's toxicity should be assessed in terms of its "degree of risk," and that this could be measured by comparing constituent concentrations at the point of exposure to appropriate toxicity reference levels. Two commenters stated that toxicity should be measured at a likely point of human exposure rather than at the waste site.

The toxicity of a substance, as used in the HRS, is an inherent property, often expressed quantitatively as a dose or exposure concentration associated with a specific response (i.e., a dose-response relationship). These toxicity values, in general, are independent of expected environmental exposure levels; many are based on laboratory tests on animals. Risk, on the other hand, is a function of toxicity, the concentration of a substance in environmental media to which humans may be exposed, and the likelihood of exposure to that medium (and the population likely to be exposed). The toxicity factor in the waste characteristics factor category of the HRS is intended to reflect only the inherent toxicity (i.e., the basic dose-response relationship) of substances found at the site. The HRS as a whole is intended to evaluate, to the extent feasible, relative risks posed by sites by including factors for likelihood of release, waste quantity, toxicity, and the proximity of potentially exposed populations. If actual contamination (for example, of drinking water) has been detected at a site, the measured environmental concentration of each substance is compared with its appropriate health-based or ecological-based concentration limit (i.e., its benchmark). If these environmental concentrations equal or exceed a benchmark, certain target factors are assigned higher values than if environmental concentrations are less than benchmarks.

Two commenters suggested using Cancer Potency Factors to score toxicity only for Class A and B1 carcinogens, and using reference doses (RfDs) for scoring Class B2 and C carcinogens (i.e., substances for which there is inadequate or no direct human evidence of carcinogenicity).

In response, EPA believes that because the HRS is a screening tool, it should maintain a conservative (i.e., protective) approach to evaluation of potential cancer risks. EPA's 1986 *Guidelines for Carcinogen Risk Assessment* (51 FR 34014, September 24, 1986) provide for substances in Class A and Class B (both B1 and B2) to be regarded as suitable for quantitative human risk assessment. In general, according to EPA's 1989 *Risk Assessment Guidance for Superfund: Human Health Evaluation Manual*, Class C substances are evaluated for cancer risks within the Superfund risk assessment process. Thus, the use of cancer risk information for Class B2 and C substances in the HRS is consistent with the objective of maintaining a conservative approach and with other Agency and Superfund program risk assessment guidelines.

In response to comments that the best available data should be used to score sites, that accepted Agency practices be relied on, and that consistency across pathways be encouraged, the Agency has modified slightly the way the toxicity value for a substance is selected. The final rule requires the use of carcinogenicity and chronic toxicity data, when available, over acute toxicity data. If both slope factors and RfDs are available, the higher of the values assigned for these types of toxicity parameters is used. If neither is available, but acute toxicity data are available, the acute toxicity data are used to assign toxicity factor values. EPA decided to give preference to slope factors and RfD values because these undergo more extensive Agency review and are based on long-term exposure studies.

E. Radionuclides

The proposed HRS assigned radionuclides a maximum toxicity value, but included no other procedures specific to radionuclides.

One commenter, the U.S. Department of Energy (DOE), asserted that the proposed HRS "* * * contains an inequitable bias regarding radionuclides * * *" DOE specifically criticized assigning maximum toxicity factor values to radionuclides, "* * * where, in fact, the health impact associated with radionuclides is associated with the type of decay, the level of decay energy, the half-life, the mobility, the concentration of the radionuclide, internal biological factors, and external pathway factors." DOE proposed using concepts for evaluating radionuclides that were included in its Modified Hazard Ranking System (mHRS). In its subsequent comments on the HRS field test report, DOE stated that it considered the "* * * method of handling radionuclides in the proposed revised HRS to be a serious flaw in the evaluation system."

In the final rule, EPA has clarified and significantly changed how radionuclides are evaluated. Instead of using or adapting the mHRS directly, however, EPA modified the proposed HRS to account more fully for radionuclides based on EPA's own methods for evaluating them, which are similar to and generally consistent with the radiation analysis concepts underlying the mHRS.

The final rule evaluates radionuclides within the same basic structure as other hazardous substances, and the evaluation of many individual HRS factors is the same whether radionuclides are present or not. Table 7-1 of the final rule lists HRS factors and indicates which are evaluated differently for radionuclides. Essentially, radionuclides are simply treated as additional hazardous substances with certain special characteristics that are accounted for by separate scoring rules for some HRS factors. For sites containing only radionuclides, the scoring process is very similar to the process at other hazardous substance sites, except that different scoring rules are applied to a number of substance-specific factors and a few other factors. For sites containing both radionuclides and other hazardous substances, both types of substances are scored for all HRS factors that are substance-specific, with overall factor values based either on combined values or the higher of the values, as appropriate.

EPA notes that, although some radioactive substances are statutorily excluded from the definition of "hazardous waste" in both CERCLA and RCRA (specifically, source, special nuclear, and byproduct material as defined in the Atomic Energy Act of 1954), such substances may be, and generally are, "hazardous substances" as defined in section 101(14) of CERCLA and therefore may be addressed under CERCLA. Radioactive substances should be included in HRS scoring and section 7 of the final rule is intended to facilitate that analysis. It also should be noted that two narrow categories of releases (either from "nuclear incidents" or from sites designated under the Uranium Mill Tailings Radiation Control Act of 1978) are excluded from CERCLA's definition of the term "release" (CERCLA section 101(22)), and such releases should not be scored using the HRS.

The major changes to the HRS in the evaluation of radionuclides apply to establishing observed releases, to factors in the waste characteristics category, and to determining the level of actual contamination in the targets factor category. The HRS components that have been modified are briefly described below.

The criteria for establishing an observed release through analysis of samples for radionuclides differ considerably from the criteria used for other hazardous substances. These criteria are divided into three groups: radionuclides that occur naturally or are ubiquitous in the environment; manmade radionuclides that are not ubiquitous in the environment; and gamma radiation (soil exposure pathway only). (See § 7.1.1.)

The hazardous waste quantity factor for sources (and areas of observed contamination) containing radionuclides has been modified to reflect the different units used to measure the amount of radiation (curies, a measure of activity) versus the units used for other hazardous substances (pounds, a measure of mass). EPA believes it is preferable to use activity units rather than mass units because activity is the standard measure of radiation quantity and is a better indicator of energy released and potential to cause human health damage than is mass. In addition, the hierarchy for evaluating the waste quantity factor for sources (and areas of observed contamination) containing radionuclides is limited to Tiers A and B. Tiers C and D, based on source volume and source area, respectively, are not used because adequate data to derive their quantitative relationship to Tier A were unavailable. Thus, the waste quantity factor is based either on radionuclide constituent quantity (Tier A) or radionuclide wastestream quantity (Tier B).

For sites containing only radionuclides, hazardous waste quantity is calculated based on the activity content of the radionuclides or radionuclide wastestreams associated with each source. For sites with both radionuclides and other hazardous substances, hazardous waste quantity is evaluated separately for the two types of hazardous substance for each source, and the values are then summed in determining the hazardous waste quantity value. The scale for scoring radionuclide waste quantity was derived based on concepts of risk equivalence between radionuclides and other hazardous substances.

In the proposed rule, all radionuclides were automatically assigned a maximum default value for the toxicity factor. The final rule evaluates radionuclides individually on the basis of human toxicity, across a range of factor values based on the potential to cause cancer (i.e., cancer slope factors). Non-cancer effects are not considered for radionuclides because cancer is generally the most significant toxic effect. Incorporated in the development of cancer slope factors are the type of radioactive decay; energy emitted during decay; biological uptake, distribution, and retention; and radiation dose-response relationship. Thus, across the set of scoring ranges used, radionuclides that are more potent carcinogens per unit activity now receive higher toxicity factor values than those that are less potent. The new toxicity scoring scale for radionuclides was derived in a manner consistent with the derivation of the existing carcinogenicity scale for other hazardous substances. Taken together, the new toxicity and hazardous waste quantity scales for radionuclides result in a risk equivalence between radionuclides and other hazardous substances.

Mobility of radionuclides in both the air and ground water migration pathways is evaluated in the same way as mobility for other hazardous substances; that is, on the basis of the chemical and physical characteristics of the radionuclide. Similarly, the bioaccumulation (and ecosystem bioaccumulation) potential factor is evaluated in the same way for radionuclides as for other hazardous substances. The final rule clarifies that radionuclides should be scored for these factors in all relevant pathways.

The persistence factor in the surface water migration pathway has been modified so that radionuclides are evaluated solely on the basis of half-life, which for HRS purposes is based on both radioactive half-life and volatilization half-life. Sorption to sediments is not considered, nor are hydrolysis, photolysis, or biodegradation. Other than this change in the processes considered to estimate surface water half-life, the scoring of the persistence factor is the same for radionuclides as for other hazardous substances.

The final rule extends to radionuclides the benchmark concept used throughout the HRS for weighting certain targets factor values. Measured levels of specific radionuclides at potential exposure points are compared to benchmark levels, and additional weight is given to targets subject to actual contamination (Levels I and II). This approach for weighting target factors using benchmarks is similar for radionuclides and for other hazardous substances, although both the specific benchmark values used for radionuclides and the methods for deriving the values are different. Benchmarks for evaluating radionuclide contamination parallel those used for other hazardous substances in that available Federal standards and screening concentrations are used when applicable. At sites with both radionuclides and other hazardous substances, each radionuclide and other substance is evaluated separately. If no individual substance equals or exceeds its benchmark, the ratios of the measured concentrations to the screening concentrations for cancer for radionuclides and other hazardous substances are added. Radionuclides are not evaluated using screening concentrations for non-cancer effects.

Specific benchmark values for radionuclides are in activity units instead of mass units, however, to reflect the appropriate measurement units for the level of radionuclide contamination. Radionuclide benchmarks include drinking water maximum contaminant levels (MCLs) for both the ground water and the surface water/drinking water threat pathways; Uranium Mill Tailings Radiation Control Act (UMTRCA) standards for the soil exposure pathway; and screening levels corresponding to 10^{-6} individual cancer risk for inhalation or oral exposures, as derived from cancer slope factors, for all pathways and threats incorporating human health benchmarks. The radionuclide benchmarks are consistent with EPA's radionuclide risk assessment methods in that they incorporate standard data or assumptions about contact/consumption rates for various environmental media and radiation dose-response, as well as the specific radionuclide's type of decay, decay energy, biological absorption, and biological half-life. Furthermore, radionuclide benchmarks for the soil exposure pathway account for external exposure (i.e., exposure to radiation originating outside the human body) from gamma-emitting radioactive materials in surficial material as well as from ingestion, which is the sole basis for non-radioactive hazardous substance benchmarks for the soil exposure pathway, because external exposure from gamma-emitting radionuclides can be an extremely important exposure route.

F. Mobility/Persistence

The proposed rule added mobility factors to both the ground water and air migration pathways and modified the persistence factor in the surface water migration pathway to consider a greater number of potential degradation mechanisms.

The Agency received a large number of comments critical of several aspects of the ground water mobility factor. The most common issues included:

• Concern about the use of coefficients of aqueous migration to establish mobility values for inorganic cations and anions;

• Suggestions that solubility values, distribution coefficients, and other measures be used to establish mobility values for anions and cations; and

• Requests that the same measures of mobility be used for organics and inorganics.

Criticism of the use of the coefficients of aqueous migration focused on its obscurity; except for geochemists, few scientists are familiar with the measure. In response to these comments and because coefficients of aqueous migration are not available for all hazardous substances and radionuclides, the Agency decided to replace coefficients of aqueous migration.

The majority of commenters stated a preference for using parameters related either to hazardous substance release (solubility) or to transport (distribution coefficients) as measures of mobility. The ground water mobility factor is intended to reflect the fraction of a hazardous substance expected to be released from sources, migrate through porous media, and contaminate aquifers and the drinking water wells that draw from them. Because mobility is concerned with both release and transport, the Agency concluded that mobility for all hazardous substances in ground water will be evaluated using both solubility and distribution coefficient values. A default value is assigned when none of the hazardous substances eligible to be evaluated can be assigned a mobility factor value based on available data.

A number of commenters raised questions about the persistence factor in the surface water migration pathway. In general, the commenters were divided between those who wanted more degradation mechanisms considered and those who believed the equation in the proposed rule for calculating half-lives was too complex. Several commenters suggested including sorption of substances by sediments.

In response to these comments, EPA has made several changes to the persistence factor. The free-radical oxidation half-life has been dropped from the equation used to calculate half-life because the data on which its half-life values are based are typically derived from ideal, laboratory conditions that differ greatly from conditions found in nature; few field validation studies have been conducted to provide a basis for extrapolating these laboratory values to natural environments. Thus, EPA concluded that including free-radical oxidation in the persistence equation resulted in an overemphasis of the influence of free-radical oxidation as a degradation mechanism. For hazardous substances that sorb readily to particulates found in natural water bodies, the persistence equation as proposed overemphasized the importance of degradation mechanisms that occur in the liquid phase. Log K_{ow}, the logarithm of the n-octanol-water partition coefficient, has been added to account for sorption to sediments.

The Agency received several comments concerning the mobility factors in the air migration pathway. The most significant of the issues raised by commenters were:

• Whether consideration of mobility in both the likelihood of release factor category and the waste characteristics factor category counts mobility twice;

• Whether the approach used in the proposed rule properly reflected the dynamics of releases of gases from sources into the atmosphere; and

• Whether the Thornthwaite P-E Index was sufficient as the sole measure of particulate mobility and whether particle size should be included.

In response to these and other related structural and air migration pathway comments, the Agency thoroughly re-assessed the adequacy of the mobility factors in the likelihood of release and waste characteristics factor categories. Based on this review, EPA has made several changes to the mobility factors in the final rule. In response to the "double counting" issue, the Agency believes there are differences between mobility in the context of likelihood of release and mobility in the context of waste characteristics. The potential to release mobility factor is a measure of the likelihood that a source at a site will release a substance to the air; the waste characteristics mobility factor, together with the hazardous waste quantity factor, is a measure of the magnitude of release. To highlight these differences, the names of the likelihood of release mobility factors have been changed to gas (or particulate) migration potential.

In response to comments on air migration pathway mobility and structure, EPA reviewed gas and particulate release rate models to develop revised mobility factors that improve evaluations of release magnitude and duration. The gas and particulate mobility factors in the final rule are a result of that review. The gas mobility factor is based on a simplified release model and is determined by the vapor pressure of the most toxic/mobile hazardous substance available for migration to the atmosphere at the site. The particulate mobility factor is based on a simplified fine-particle wind-erosion model and reflects the combined effects of differing wind speeds and soil moisture. Analyses indicated that soil moisture was dominant over both wind speed and particle size, which are essentially equal in effect. Because of the comparative difficulty of determining particle sizes in an SI, a single particle size was assumed to apply to all sites. This constant particle size value was factored into the simplified model yielding the factor in the final rule.

C. Observed Release

The proposed HRS described how to determine whether an observed release was significantly above background levels based on multiples of detection limits and background concentrations.

Some commenters stated that the proposed revisions treated observed release in an overly complex manner. A number of commenters, primarily from the mining industries, were concerned about the consideration of background concentration in determining an observed release. (See Section III P below for a summary of their concerns and EPA's response.)

As in the proposed rule, observed releases may be established based on either direct observation or chemical analysis of samples. In the case of direct observation, material (e.g., particulate matter) containing hazardous substances must be seen entering the medium directly or must have been deposited in the medium.

EPA has replaced the proposed rule criteria for establishing an observed release by chemical analysis with simpler criteria. In the final HRS, an observed release is established when a sample measurement equals or exceeds the sample quantitation limit (SQL) and is at least three times above the background level, and available information attributes some portion of the release of the hazardous substance to the site. (The SQL is the quantity of a hazardous substance that can be reasonably quantified, given the limits of detection for the methods of analysis and sample characteristics that may affect quantitation (e.g., dilution, concentration).) When a background concentration is not detected (i.e., below detection limits), an observed release is established when the sample measurement equals or exceeds the SQL. Any time the sample measurement is less than the SQL, no observed release is established. Table 2-3 of the final rule provides the criteria for determining when analytic sampling information is sufficient for establishing an observed release (or observed contamination in the soil exposure pathway). The final rule also provides procedures to be followed when the SQL is unavailable and defines various types of detection and quantitation limits in the context of the HRS. (See § 2.3 of the final rule.)

H. Benchmarks

SARA requires that EPA give high-priority to sites that have led to closing of drinking water wells or contamination of principal drinking water supplies. To respond to this mandate, the proposed rule added health-based benchmarks to the ground water and surface water migration pathways; in addition, ecological-based benchmarks were added to evaluate sensitive environments targets in surface water. In the proposed rule, population factors were evaluated at Level I if a health-based benchmark had been exceeded. If actual contamination was present, but the benchmark was not exceeded, populations were evaluated based on two levels of contamination (i.e., Level II and Level III). Sensitive environments in the surface water migration pathway were evaluated based on two levels of actual contamination (exceeding benchmark or not exceeding benchmark). Where several hazardous substances were present below benchmarks, the percentages of their concentrations relative to their benchmarks were added to determine which level was used to assign values.

Of the commenters on this issue, most supported EPA's proposal to give extra weighting to sites where measured exposure-point concentrations exceed benchmarks. One commenter who dissented suggested giving extra weighting to sites where actual contamination is documented; documentation of an observed release (or observed contamination) would be the only criterion for assigning higher values to target factors, and the relationship of the concentration of hazardous substances to benchmarks would not be used. The other dissenting commenter suggested that EPA re-evaluate the role of health-based benchmarks in the HRS because common sense, and other laws, will discourage people from drinking water contaminated above benchmark levels, and because evaluating this factor will entail large resource expenditures for marginal gains in discrimination.

The final rule weights most targets based on actual and potential exposure to contamination across all pathways and threats, including those for which benchmarks were not originally proposed, because EPA believes that this approach both improves the ability of the HRS to identify sites that pose the greatest threat to human health and the environment and increases the internal consistency of the HRS. (See §§ 2.5, 2.5.1, 2.5.2, 3.3.1, 3.3.2, 4.1.2.3.1, 4.1.2.3.2, 4.1.3.3.1, 4.1.3.3.2, 4.1.4.3.1, 4.2.2.3.1, 4.2.2.3.2, 4.2.3.3.1, 4.2.3.3.2, 4.2.4.3.1, 5.1.3.1, 5.1.3.2, 6.3.1, 6.3.2, 6.3.4, 7.3.1, 7.3.2.) In the final rule, both the population factors and the factors reflecting the hazard to the nearest individual (or well or intake) are evaluated in relation to health-based benchmarks in all pathways. The sensitive environment factor in the surface water environmental threat is weighted in relation to ecological-based benchmarks; however, in the soil exposure and air migration pathways, the sensitive environment factor is weighted simply on the basis of exposure to actual contamination, and no benchmarks are used.

The Agency chose to use benchmarks in all pathways in response to comments that specifically suggested such a change; it is also responding to comments that the HRS should better reflect relative risks and that the approaches in all pathways should be consistent. The Agency has concluded that the concerns expressed by commenters outweigh the concerns about uncertainties in the evaluation of samples collected in air and soil and about the lack of regulatory standards and criteria on which to base soil or air benchmarks that led the Agency not to include benchmarks for those pathways in the proposed rule. In short, EPA carefully considered this point and concluded that the consistent application of benchmarks across all pathways provides for the most reasonable use of data given the purpose of the HRS as a screening tool.

EPA generally selected specific criteria based on applicable or relevant and appropriate requirements (ARARs), excluding State standards, that have been selected for the protection of public health and the environment as outlined in the NCP (55 FR 8666, March 8, 1990). In the HRS NPRM, EPA proposed to use MCLs, maximum contaminant level goals (MCLGs), and screening concentrations (SCs) based on cancer slope factors as drinking water benchmarks, and Food and Drug Administration (FDA) Action Levels as benchmarks for the human food chain threat. EPA also proposed to use Ambient Water Quality Criteria (AWQC) as ecological-based benchmarks for the environmental threat. EPA received 21 comments from 12 commenters on which benchmarks the HRS should use and whether additional information should be considered in establishing benchmarks. Opinion was divided on the use of specific types of benchmarks: three commenters supported the use of MCLs; three did not. Two commenters supported the use of MCLGs, two opposed such use, and one suggested that EPA consider the economic impact of using the value of 0 (i.e., the MCLG for a carcinogen) as a health-based benchmark. Two commenters suggested including relevant State drinking water standards, and one suggested including concentrations based on RfDs. One commenter expressed concern that the current lack of water quality standards for many substances might make the benchmark system ineffective in identifying sites that pose a significant threat to human health. Two commenters suggested that carcinogen weight of evidence should be used in establishing SCs (e.g., the individual risk level should be lower for a Class A carcinogen than for a Class B2 carcinogen). Two commenters suggested considering other important routes of exposure (e.g., inhalation of hazardous substances volatilized from water, or dermal contact with contaminated water) in establishing drinking water benchmarks.

EPA conducted a number of analyses on specific benchmarks and on the modification of factors to consider in establishing HRS benchmarks. As a result of public comments and these analyses, EPA has concluded that the HRS is improved by including concentrations based on nationally uniform standards, criteria, or toxicity values as health-based or ecological-based benchmarks in all pathways and threats. EPA's conclusion is based on several considerations. First, the addition of benchmarks across all pathways and the use of ARARs for those benchmarks improves linkages with the RI/FS process. That is, the HRS benchmarks will be those used most frequently during RI/FSs, and the additional points provided by equalling or exceeding a benchmark will aid in identifying areas requiring follow-up in the RI/FS. Second, the internal consistency of the HRS is improved by using benchmarks because concentrations measured at or above benchmark levels are treated in a parallel manner across all pathways, allowing more consistent and fuller use of the relatively costly sampling data collected during the SI. Third, the number of hazardous substances for which at least one health-based or ecological-based benchmark is available is increased, allowing for more uniform assessment of sites nationwide.

The benchmark criteria that the Agency has concluded are most appropriate for each pathway and threat are listed below. As discussed above, EPA agrees with comments suggesting that benchmarks also be used in the soil exposure and air migration pathways and has selected criteria for these pathways based upon the kinds of factors discussed above. While EPA believes the criteria for the soil exposure and air migration pathways in the final rule are appropriate, it is open to any comments that members of the public may wish to submit regarding these criteria and specifically solicits such comments at this time. EPA asks that any such comments be submitted on or before (30 days after the date of publication in the Federal Register).

For the final rule; EPA has selected the following types of benchmarks in each pathway and threat, subject to any revisions in the criteria for air and soil exposure that may be made in response to comments. (Benchmarks for radionuclides are discussed in Section III E of this preamble.)

- Benchmarks in the ground water migration pathway and the surface water drinking water threat include MCLs, non-zero MCLGs, screening concentrations (SCs) for non-cancer effects based on RfDs for oral exposures, and SCs for cancer based on slope factors for oral exposures and 10^{-6} individual cancer risk (see Table 3-10). Because SCs based on RfDs and slope factors are used as drinking water benchmarks, MCLGs with a value of 0 have been dropped as HRS benchmarks.
- Benchmarks in the surface water human food chain threat include FDA Action Levels for fish or shellfish, SCs for non-cancer effects based on RfDs for oral exposures, and SCs for cancer based on slope factors for oral exposures and 10^{-6} individual cancer risk (see Table 4-17).
- Benchmarks in the surface water environmental threat include AWQC and Ambient Aquatic Life Advisory Concentrations (AALACs); AALACs will be considered as they become available (see Table 4-22).
- Benchmarks in the soil exposure pathway include SCs for non-cancer effects based on RfDs for oral exposures, and SCs for cancer based on slope factors for oral exposures and 10^{-6} individual cancer risk (see Table 5-3).
- Benchmarks in the air migration pathway include National Ambient Air Quality Standards, National Emission Standards for Hazardous Air Pollutants (NESHAPs) that are expressed in ambient concentration units, SCs for non-cancer effects based on RfDs for inhalation exposures, and SCs for cancer based on slope factors for inhalation exposures and 10^{-6} individual cancer risk (see Table 6-14).

Several commenters suggested technical refinements for deriving health-based benchmarks. Although qualifying information is useful and important and is, in fact, used extensively in the RI/FS process, the benefits of including such information in the HRS must be balanced against its limited scope and purpose as well as the limited data available to determine concentration at the point of exposure. Consequently, in the final rule:

- All health-based benchmarks are set in reference to the major exposure concern for each pathway or threat (e.g., benchmarks in the air migration pathway are set in reference to inhalation only; benchmarks in drinking water, the human food chain threat, and the soil exposure pathway are set in reference to ingestion), except for radionuclides for which external exposure is also considered in the soil exposure pathway;
- All benchmarks are set in reference to uniform exposure assumptions that are consistent with RI/FS procedures (e.g., water consumption is assumed to be two liters per day; body weight is assumed to be 70 kg);
- State water quality standards and other State or local regulations are not included as benchmarks because they would introduce regional variation in the HRS;
- A hierarchy has been developed to provide a single benchmark concentration for each hazardous substance by pathway and threat; and
- Qualitative weight-of-evidence is not used in deriving SCs for carcinogens.

In the NPRM, EPA requested comments on how many tiers (levels) of actual contamination to consider when weighting populations relative to benchmarks (i.e., which of three alternative methods presented should be adopted). EPA received two comments on this issue and three related comments regarding the weighting factors for each level. One commenter supported Alternative 2 (i.e., use of two levels of observed contamination and one level of potential contamination). Another commenter suggested that Level II and Level III concentrations be combined to include the range of contaminant levels above background, but below health-based benchmarks. A third commenter suggested that the weighting factors for each level be reconsidered. A fourth commenter suggested that $1/1000$ of a benchmark factor is inappropriate because it is excessively conservative and difficult to detect. The fifth commenter suggested that because Level III represents concentrations with cancer risks below 10^{-7}, populations exposed to Level III concentrations should not be considered in the population category of drinking water threats.

EPA conducted a number of analyses on the subject of benchmark tiers and has dropped Level III contamination. In the final rule, Level I contamination is defined as concentration levels for targets which meet the criteria for actual contamination (see § 2.5 of the final rule) and are at or above media-specific benchmark levels; Level II contamination is defined as concentration levels for targets which either meet the criteria for actual contamination but are less than media-specific benchmarks, or meet the criteria for actual contamination based on direct observation; and potential contamination is defined as targets that are potentially subject to releases (i.e., targets that are not associated with actual contamination for that pathway or threat). These three tiers are used to assign values to both the nearest individual (or well or intake) and the population factors. As a result of EPA's analyses of benchmark issues, the weighting assigned to Level I and Level II contamination has been changed and made consistent across pathways. For example, Level I populations are now multiplied by a factor of 10 in all pathways. As in the proposed rule, potentially contaminated populations and nearest individuals (or wells or intakes) are distance or dilution weighted.

The proposed rule summed the ratios of all hazardous substances to their individual benchmarks as a means of defining the level of actual contamination, and EPA requested comments on the appropriateness of this approach to scoring multiple substances detected in drinking water. Of the 10 comments in response to this proposal, nine strongly opposed the proposed approach, particularly when applied to drinking water standards (i.e., MCLs), MCLGs, and noncarcinogens. One commenter supported the proposed approach.

EPA has decided to retain the summing of ratios of hazardous substances to their individual benchmarks, but in a modified form. The final rule sums measures of carcinogenic and noncarcinogenic effects separately;

concentrations specified in regulatory limits (e.g., NAAQS, MCLs, or FDA Action Levels) are not included in the summing algorithm. EPA recognizes that a more precise estimate of relative risk would be obtained by summing the ratios of hazardous substances to their individual RfD-based concentrations by segregating substances according to major effect, target organ, and mechanism of action. In fact, such a segregation is recommended during the RI/FS. However, health-based benchmarks are used in the HRS to provide a higher weight to populations exposed to hazardous substances at levels that might result in adverse health effects. As a consequence, EPA believes that use of the summed ratios of hazardous substances within pathways and threats to their individual RfD-based benchmark levels is appropriate for the screening purpose of the HRS.

EPA proposed and solicited comments on a range of 10^{-4} to 10^{-7} for individual cancer risk levels of concern in establishing levels of actual contamination with respect to health-based benchmarks. EPA received eight comments concerning this risk range. Four commenters suggested restricting the range to 10^{-4} to 10^{-6}, primarily because this range would be consistent with risk levels identified in the NCP and used by other EPA regulatory programs. Three commenters said the SCs for carcinogens should be the 10^{-6} individual cancer risk level. One commenter stated that 10^{-4} to 10^{-7} generally is the risk range considered for Superfund response. The final rule defines only two levels of actual contamination: significantly above background and equal to or above benchmark, and significantly above background but less than benchmark. When an applicable or relevant and appropriate requirement does not exist for a carcinogen, EPA selects remedies resulting in cumulative risks that fall within a range of 10^{-4} to 10^{-6} incremental individual lifetime cancer risk based on the use of reliable cancer potency information. EPA has selected the 10^{-6} screening risk level in defining the HRS benchmark level for cancer risk because it is the lower end of the cancer risk range (i.e., 10^{-4} to 10^{-6}) identified in the NCP and used by other EPA regulatory programs.

Two commenters objected to assigning releases of substances with no benchmarks to Level II as a default value. One suggested assigning unknowns to Level III because substances that are frequently released or are known or suspected to cause health problems are studied before those that are not. The other objected because "the absence of data is not data."

Because EPA has decided to adopt a benchmark system incorporating only two levels of actual contamination, the default level is Level II. If none of the hazardous substances eligible to be evaluated at a sampling location has an applicable benchmark, but actual contamination has been established, the actual contamination at the location is assigned to Level II.

I. Use Factors

The proposed HRS included factors to assign values to uses of potentially affected resources in the three migration pathways: ground water use (drinking water and other) in the ground water migration pathway, drinking water and other use and fishery use in the surface water migration pathway, and land use in the air migration pathway.

EPA received a number of comments on each of these factors. The commenters raised specific objections to distinctions drawn among various potential uses and to the weights assigned to those uses. For example, for the ground water use factor, some commenters asserted that the HRS should not delineate between private and public water supply contamination. For the surface water use factors, a commenter recommended a range of assigned values for irrigation of commercial food or forage crops because of variations in rates of uptake of hazardous substances. For the land use factor, two commenters urged giving greater consideration to institutional land use because of the sensitive populations that would be exposed.

Partly in response to these comments, and in an effort to simplify the HRS, EPA has substantially revised the method of incorporating resource use information in targets factor categories. The field test indicated that collecting data on each of the use factors involved considerable effort at many sites. In addition, because of weighting factors applied to potentially contaminated populations, at sites with no actual contamination, use factors were contributing more to the targets value than were large populations. As some commenters pointed out, the use factors mixed concerns about human health with concerns about the value of the resource and, therefore, were partially redundant with population factors. To avoid redundancy with human health concerns as evaluated through the population factor, EPA has made major changes in how resource uses are evaluated and scored in the final rule.

In each migration pathway, the use factors have been replaced by a resources factor that assigns values to resources appropriate for the pathway. In addition, a resources factor has been added to the soil exposure pathway. The resources factor for a pathway is assigned a maximum of five points if any of the resource uses for that pathway exists within the target distance limit in the ground water or surface water migration pathway, within one-half mile of a source in the air migration pathway, or within an area of observed contamination in the soil exposure pathway. If none of the uses exists, the factor is assigned a value of 0.

The resources factor in the ground water migration pathway assigns a value of 5 for wells supplying water for irrigation of commercial food or commercial forage crops (five-acre minimum), watering of commercial livestock, as an ingredient in commercial food preparation, or as a supply for commercial aquaculture or for a major or designated water recreation area (excluding drinking water use)—for example, water parks (see § 3.3.3). A value of 5 is also assigned if the water in the aquifer is usable for drinking water, but not used.

The resources factor in the drinking water threat of the surface water migration pathway assigns a value of 5 if the surface water is designated by a State for drinking water use but not used, or is usable but not used for drinking water. In addition, points may be assigned for intakes supplying water for irrigation of commercial food or commercial forage crops (five-acre minimum), watering of commercial livestock, as an ingredient in commercial food preparation, or if the water body is used as a major or designated water recreation area (see § 4.1.2.3.3). The fishery use factor has been deleted to avoid double-counting of fisheries.

In the air migration pathway, the resources factor is assigned a value of 5 if there is commercial agriculture or commercial silviculture, or a major or designated recreation area within a half mile of a source (see § 6.3.3). The distance of one-half mile for the agricultural, silvicultural, and recreational areas was determined by the distance weighting factors for the air migration pathway, which reflect the rapid diminishing of air contaminant concentrations beyond one-half mile from a source. Therefore, resources beyond this distance are not considered in this pathway.

A resources factor has also been added to the resident population threat of the soil exposure pathway. The factor is assigned a value of 5 if there is commercial agriculture, commercial silviculture, or commercial livestock production or grazing on an area of observed contamination at the site.

J. Sensitive Environments

The proposed rule expanded the list of sensitive environments considerably and, for the surface water and air pathways, counted all sensitive environments within the target distance limit, rather than just the one with the highest assigned value; for the soil exposure pathway, only the sensitive environment assigned the highest value was counted. Potentially contaminated sensitive environments were distance/dilution weighted; in the surface water environmental threat, actual contamination of sensitive environments was evaluated on the basis of ecological-based benchmarks.

EPA received relatively few comments on issues related to sensitive environments. However, participants in the field test requested clarification of three categories of sensitive environments involving spawning areas, migratory pathways, and feeding areas critical for the maintenance of a fish species within a river system, coastal embayment, or estuary. In particular, critical migratory pathways and feeding areas were difficult to identify and seemed to provide little discrimination among surface waters in some areas of the country.

EPA has redefined critical spawning areas to include shellfish beds, and has limited the areas to those used for intense or concentrated spawning by a given species. Critical migratory pathways and feeding areas have been combined into a single category and limited to anadromous fish (i.e., fish that ascend from the ocean to spawn), which face special problems in migrating substantial distances between the ocean and their spawning areas. These feeding areas are further restricted to only those areas in which the fish spend extended periods of time. Examples include areas where juveniles of anadromous species feed for prolonged periods (e.g., weeks) as they prepare to migrate from fresh water to the ocean, and holding areas along the adult migratory pathways.

Terrestrial areas used for breeding by large or dense aggregations of vertebrates (e.g., heron rookery, sea lion breeding beach) have been added to the list of sensitive environments to parallel the spawning areas listed for fish species. Water segments designated by a State as not attaining toxic water quality standards have been removed because these environments are already degraded and thus are not analogous to the other sensitive environments listed. Also, the assigned value for State designated areas for protection or maintenance of aquatic life has been changed from 50 points to 5 points (see Table 4–23 in final rule) to be consistent with the points assigned under the resources factor for State designated areas for drinking water use.

In response to public comment, National Monuments have been added to the 100-point category on the list of terrestrial sensitive environments considered under the soil exposure pathway. "State designated natural areas" and "particular areas, relatively small in size, important to the maintenance of unique biotic communities" were also added to the list of terrestrial sensitive environments in response to public comment. These latter two categories were already considered in the air and surface water pathway evaluation of sensitive environments. (See Table 5–5.)

The method for evaluating wetlands has been revised, partially because participants in the field test had difficulty identifying discrete wetlands. Some wetlands were patchy and could be classified as one large or many small wetlands. Other wetlands were divided by rivers or roads, or changed from one type of wetland to another, making it unclear whether more than one wetland should be counted. To eliminate these difficulties, wetlands are now evaluated on the basis of size and level of contamination. In the air migration pathway, wetlands are evaluated based on acreage and level of contamination (see § 6.3.4); in the surface water migration pathway, wetlands are evaluated by linear frontage along the surface water hazardous substance migration path and level of contamination (see § 4.1.4.3.1). Distinguishing among wetlands on the basis of size and level of contamination should improve the discriminating ability of the sensitive environments factor. In the drier portions of the country, where even small wetlands (e.g., prairie potholes) are very important, small wetlands may also qualify as "particular areas, relatively small in size, important to the maintenance of unique biotic communities."

Sensitive environments other than wetlands are not evaluated on the basis of size for several reasons. Most other HRS sensitive environments tend to be less common and less widely distributed nationally than wetlands (e.g., see EPA's 1989 *Field Test of the Proposed Revised HRS*) and, therefore, their numbers and boundaries tend to be easier to identify. In addition, the value of many sensitive environments is independent of size; for example, the size of a critical habitat of an endangered species may vary solely due to the type of species present. Furthermore, potential or actual contamination of even a small portion of many sensitive environments—for example, a wildlife refuge—tends to be viewed as unacceptable.

An ecosystem bioaccumulation potential factor has been added to the waste characteristics factor category of the surface water environmental threat in response to comments that hazardous substances that demonstrate an ability to bind to sediments and/or to bioaccumulate (e.g., PCBs, mercury) tend to pose the greatest long-term threats to aquatic organisms. The accumulation of hazardous substances in the aquatic food chain can result in adverse effects in aquatic species and in other animals that ingest aquatic species (e.g., waterfowl). The ecosystem bioaccumulation potential factor differs slightly from the bioaccumulation potential factor in the human food chain threat, primarily in that all BCF data are considered in deriving it and not just BCF data for human food chain organisms.

The EPA ambient aquatic life advisory concentrations (AALACs) have been added to the data hierarchy used to assign the ecosystem toxicity value (see § 4.1.4.2.1.1). The Natural Heritage Program alternative sensitive environment rating factors have been removed from the rule because of problems that arose during the field tests; field test participants found that the availability of information varied substantially among States. However, a Natural Heritage Program Data Center can assist in identifying many of the sensitive environment types listed in Tables 4–23 and 5–5.

K. Use of Available Data

A number of commenters stated that all available data should be used when scoring a site. Several cited the tiered approach to hazardous waste quantity as a model that could be applied to other factors. Under this method, where data are available, they would be used; where data are not available, defaults or more generalized approaches would be applied. Several commenters specifically suggested using this approach for ground water flow direction and for scoring mining sites. These commenters argued that it would be less expensive and time-consuming to use available data when scoring a site than to wait until the remedial investigation to consider the additional information.

EPA considered modifying the HRS to allow the use of additional data, but determined that further expanding the HRS to account for varying levels of data availability is inconsistent with the HRS's role as an initial screening tool. Adding tiers to various factors to accommodate the use of all available data would make the HRS considerably more difficult to apply and could lead to substantial inconsistencies in how sites are investigated and evaluated. EPA Regions and States would have to determine, for each set of data presented, whether the data quality was good enough for the data to be considered. Debates over decisions on data quality could delay scoring and, ultimately, delay cleanup at sites. Therefore, the Agency believes that the limited use of tiers in the final HRS represents a reasonable tradeoff between the need to limit the complexity of the system and the desire to accommodate risk-related information that is generally outside the scope of a site inspection.

L. Ground Water Migration Pathway

The proposed rule included a number of significant changes in the ground water migration pathway: new hydrogeologic factors were added; populations were distance weighted unless exposed to actual contamination; a maximally exposed individual (MEI) factor was added; the target distance limit was extended; a mobility factor was added and combined with toxicity; and a wellhead protection area factor was added. Figure 5 shows the proposed ground water migration pathway and the final rule pathway.

Ground water flow direction. Neither the original HRS nor the proposed HRS directly considered ground water flow direction in evaluating targets. The proposed HRS indirectly considered ground water flow direction by weighting populations based on actual and potential contamination of drinking water wells.

EPA received 50 letters from 40 commenters on this issue; 27 letters responded to the ANPRM, 21 to the NPRM, and two to the field test report. Commenters included eight States, three Federal agencies, the mining, petroleum, chemical, and cement industries, utilities, and professional engineers. The commenters supported the consideration of ground water flow direction data, at least in some circumstances. Numerous commenters urged the use of ground water flow direction data when they are either available or easily obtained. They suggested several methods to incorporate flow direction, including:

- Considering use of a radial impact area when directional release routes can be determined. Only a half circle with a three-mile radius for the downgradient portion (and a half-mile radius for the rest of the circle) should be considered when scoring;
- Differentiating between upgradient and downgradient areas using topographic maps, evaluating water levels at wells, and noting the presence of major surface water bodies;
- Expending the effort to obtain accurate data and considering selected upgradient locations as a precaution against unanticipated anomalies;
- Excluding drinking water wells where analytical data prove no contamination is present;
- Having a "professional" review available information and conduct a site visit;
- Using available flow direction data and developing regionally based defaults when no data are available;
- Installing piezometers to determine flow direction in the PA/SI phase and when no ground water flow data are available;
- Incorporating ground water flow direction into the "depth to aquifer" and "distance to nearest well/population served" scores; and
- Affording responsible parties the opportunity to determine flow direction.

BILLING CODE 6560-50-M

Figure 5

Ground Water Migration Pathway

PROPOSED HRS

Likelihood of Release	X	Waste Characteristics	X	Targets
Observed Release or Potential to Release Containment Net Precipitation Depth to Aquifer/ Hydraulic Conductivity Sorptive Capacity		Toxicity/Mobility Hazardous Waste Quantity		Maximally Exposed Individual Population Ground Water Use Wellhead Protection Area

FINAL HRS

Likelihood of Release	X	Waste Characteristics	X	Targets
Observed Release or Potential to Release Containment Net Precipitation Depth to Aquifer Travel Time		Toxicity/Mobility Hazardous Waste Quantity		Nearest Well Population Resources Wellhead Protection Area

BILLING CODE 6560-50-C

Commenters suggested that data on ground water flow are either readily available or can be easily obtained at reasonable cost and are no more imprecise than other aspects of the HRS. Some commenters stated that the level of effort required to estimate the direction of ground water flow is no greater than that required to determine other hydrogeologic parameters in the HRS.

EPA reviewed a range of options for considering ground water flow direction in evaluating targets. For the reasons discussed above under "Use of Available Data," the Agency decided that it was not feasible to adopt a tiered approach in the targets factors for evaluating ground water flow direction. EPA does not agree that increased accuracy warrants the increased complexity of accounting for ground water flow direction, because this level of accuracy is not required for a screening tool that is intended to assess relative risk. This level of accuracy, however, is needed to determine the extent of remedial action and, therefore, is appropriate at the time of the RI.

EPA disagrees with the argument that determining ground water flow direction is no more difficult than determining other ground water factors. Aquifer interconnections and discontinuities as well as hydraulic conductivity and depth to aquifer, which are evaluated in the final rule, are geologic features that are unlikely to change over the short-term. In contrast, ground water flow direction can be influenced by factors such as seasonal flows and pumping from well fields. In addition, the ground water flow direction may be different in each aquifer at the site, and the direction of hazardous substance migration is not always the same as the direction of ground water flow. Therefore, data on ground water flow direction would need to be considerably more extensive than would the data required to document the other hydrogeologic factors. EPA notes that in the final rule, many of the other hydrogeologic factors considered have been simplified and the sorptive capacity factor has been dropped. EPA also notes that ground water flow direction was not identified in SARA as a portion of the HRS requiring further examination, even though ground water flow direction was not considered in the original HRS and the Agency had received criticism similar to the above comments prior to enactment of SARA.

Although the final rule does not consider ground water flow direction directly in evaluating targets, it does consider flow direction indirectly in the method used to evaluate target populations. If wells have not been contaminated by the site, as the commenters assume upgradient wells would not be, the population drawing from those wells is distance weighted and, thus, populations drawing from the wells would have to be substantial before a large number of points could be assigned. Moreover, in addition to providing a measure of the population at risk from the site, the target factors afford a measure of the value of the ground water resources in the area of the site and of the potential need for expanded uses of the ground water.

Aquifer interconnections. Aquifer interconnections facilitate the transfer of ground water or hazardous substances between aquifers. The final rule specifies that if aquifer interconnections occur within two miles of the sources at the site (or within areas of observed ground water contamination attributed to sources at the site that extend beyond two miles from the sources), the interconnected aquifers are treated as a single aquifer for the purposes of scoring the site. Thus, for example, when an observed release to a shallow aquifer has been identified, targets using deeper aquifers interconnected to the shallow aquifer are included in the evaluation of the combined aquifer. This approach is common to the original as well as the revised HRS.

In practice, EPA has found that studies in the field to determine whether aquifers are interconnected in the vicinity of a site will generally require resources more consistent with remedial investigations than SIs, especially where installation of deep wells is necessary to conduct aquifer testing. Thus, EPA has in the past relied largely on existing information to make such determinations and the Agency finds it necessary to continue that approach. Examples of the types of information useful in identifying aquifer interconnections were given in the proposed rule. This information includes literature or well logs indicating that no lower relative hydraulic conductivity layer or confining layer separates the aquifers being assessed (e.g., presence of a layer with a hydraulic conductivity lower by two or more orders of magnitude); literature or well logs indicating that a lower relative hydraulic conductivity layer or confining layer separating the aquifers is not continuous through the two-mile radius (i.e., hydrogeologic interconnections between the aquifers are identified); evidence that withdrawals of water from one aquifer (e.g., pumping tests, aquifer tests, well tests) affect water levels in another aquifer; and observed migration of any constituents from one aquifer to another within two miles. For this last type of information, the mechanism of vertical migration does not have to be defined, and the constituents do not have to be attributable to the site being evaluated. Other mechanisms that can cause interconnection (e.g., boreholes, mining activities, faults, etc.) will also be considered. While the descriptive text has been removed from the rule, the approaches mentioned in the proposed rule will be used in making aquifer interconnection determinations. In general, EPA will base such determinations on the best information available; in the absence of definitive studies and where costs of field studies are prohibitive, the Agency will rely on expert opinion (e.g., U.S. Geological Survey staff or State geologists). In the absence of such information, EPA assumes that aquifers are not interconnected.

Ground water potential to release factors. EPA proposed replacing the depth to the aquifer of concern and permeability factors of the original HRS with depth to aquifer/hydraulic conductivity and sorptive capacity factors. EPA received more than 75 comments on these factors, in addition to general comments on evaluating ground water potential to release in response to the ANPRM.

Several commenters supported consideration of depth to aquifer in evaluating the ground water migration pathway. One commenter stated that use of a depth to aquifer/hydraulic conductivity matrix, which was intended to reflect travel time to ground water, was an improvement over considering these two parameters individually and additively. Concerns were raised, however, about how to determine depth to aquifer. In addition, commenters stated that the two-mile radius for evaluating hydrogeologic factors should be extended to four miles, while others commented that the distance should be measured from vertical points as near to the source as possible.

Commenters generally supported the proposal to include hydraulic conductivity, although many believed that the proposed method was too complicated; several commenters suggested that the single least conductive layer(s) should be used. Another concern was the lack of data for determining hydraulic conductivity. One commenter stated that unless data can confirm that the geologic strata extend throughout the entire area of a site, assigning a hydraulic conductivity value is highly questionable.

Some commenters offered alternative approaches to evaluating hydraulic conductivity. These included replacing the proposed method with:

• Assigned "confidence levels" tied to professional estimates based on regional data and judgment;

• Consideration of actual travel time in the unsaturated zone; or

• An assumption of maximum hydraulic conductivity among the various geological layers below the site.

More than 20 comments were received on the sorptive capacity factor, but there was little consensus among the commenters. A number of commenters agreed that the factor should be added, but stated that the approach was not detailed enough and that more waste- and site-specific information should be required. Other commenters agreed that the factor was an improvement, but said that sorptive capacity should be dropped because the waste- and site-specific information needed for an accurate evaluation cannot be collected during a screening process. Others said that it was too complex as proposed and should be dropped.

Based on these comments and the field test results, EPA examined the depth to aquifer/hydraulic conductivity and sorptive capacity factors. The examination showed that the lowest hydraulic conductivity layer(s) accounted for almost all of the travel time to the aquifer if a one-foot or three-foot minimum layer thickness was used. Accordingly, in the final rule, the depth to aquifer/hydraulic conductivity factor has been replaced with a simpler factor, travel time, which is determined using a matrix of the hydraulic conductivity and thickness of the lowest hydraulic conductivity layer(s) with at least a three-foot thickness. (See § 3.1.2.4 and Table 3-7 of the final rule.)

To conform with the change limiting the travel time factor to the least conductive layer(s), and to meet the goal of simplification, a change to the sorptive capacity factor was necessary. The proposed rule evaluated this factor using all layers between the source and the aquifer. In reexamining this factor, EPA concluded that depth to aquifer is one of the major parameters affecting total sorbent content, at least within the HRS ranges for the factor. Depth to aquifer also indirectly reflects geochemical retardation mechanisms because, all else being equal, the effect of these retardation mechanisms increases as the depth to aquifer increases. At the field test sites, using only the layer(s) of lowest hydraulic conductivity decreased the calculated sorbent content between 10 and 99 percent. For these reasons, EPA has decided to replace the sorptive capacity factor with a depth to aquifer factor. (See § 3.1.2.3 and Table 3-5 of the final rule).

M. Surface Water Migration Pathway

The proposed rule made major changes to the evaluation of releases or threatened releases to surface water. The pathway was divided into four threats: drinking water, human food chain, recreational use, and environmental. Other changes included consideration of flood potential; revision of potential overland flow; addition of dilution weights for potentially contaminated populations; extension of the target distance limit to 15 miles; revision of the persistence factor to consider more degradation mechanisms; addition of a bioaccumulation factor for evaluation of human food chain toxicity/persistence and populations; addition of ecosystem toxicity to evaluate the environmental threat; and addition of a maximally exposed individual factor (MEI) factor to the drinking water threat. Figure 6 shows the proposed rule and the overland flow/flood migration component of the surface water migration pathway in the final rule.

Recreational use threat. SARA stated that the HRS should consider threats to surface water used for recreation and drinking water, and the proposed HRS included a recreational use threat in the surface water migration pathway. A number of States, several companies and trade associations, and two Federal agencies identified problems with the proposed recreational use threat. Some commenters objected to weighting it as heavily as the drinking water threat, while others suggested that evaluating the threat was too complicated for use in a screening tool. Many commenters said that proposed methods for assigning values to recreation areas were too broadly drawn and that a limited number of recreation areas should be considered. Two commenters suggested using actual attendance data, and one commenter suggested that recreational uses be considered in other pathways as well.

EPA's field test indicated that the recreational use threat evaluation was too complex for HRS purposes and, at the same time, was not very accurate. Several field test participants commented that the recreation target population was difficult to evaluate and that the approach for determining population was inaccurate and time-consuming. In addition, the population factor did not provide meaningful discrimination among sites. The proposed rule used the physical characteristics (e.g., capital improvements) of a recreational site as the basis for determining the distance limit used to evaluate population, but because major and minor sites may have the same types of capital improvements (e.g., boat ramps, picnic facilities), the same distance limit could be associated with a minor recreation area and a major recreation area. The alternative approach would be to require actual use data to evaluate targets; however, site-specific population data are not available for many recreation areas, making it difficult to obtain accurate estimates of the population at risk. The target distance limits, which ranged from 10 to 125 miles, also contributed to the problems with evaluating targets. The Agency invited comments on refining these calculations; no alternative approaches were suggested, and EPA did not identify viable alternatives.

BILLING CODE 6560-50-M

Figure 6

Surface Water Migration Pathway

PROPOSED HRS

Likelihood of Release X **Drinking Water Threat**

Observed Release
or
Potential to Release

By Overland Flow
Containment
Runoff
Distance to Surface Water
By Flood
Containment
Flood Frequency

Drinking Water Threat

Waste Characteristics	X	Targets
Toxicity/Persistence		Maximally Exposed Individual
Hazardous Waste Quantity		Population
		Surface Water Use

\+

Human Food Chain Threat

Waste Characteristics	X	Targets
Toxicity/Persistence/ Bioaccumulation		Population
Hazardous Waste Quantity		Fishery Use

\+

Recreational Use Threat

Waste Characteristics	X	Targets
Toxicity/Persistence/Dose Adjusting Factor		Population
Hazardous Waste Quantity		

\+

Environmental Threat

Waste Characterisitics	X	Targets
Ecosystem Toxicity/ Persistence		Sensitive Environments
Hazardous Waste Quantity		

Figure 6

Surface Water Migration Pathway - Overland Flow/Flood Component

FINAL HRS

Likelihood of Release X **Drinking Water Threat**

Observed Release
or
Potential to Release

By Overland Flow
- Containment
- Runoff
- Distance to Surface Water

By Flood
- Containment
- Flood Frequency

Drinking Water Threat

Waste Characteristics X **Targets**

Waste Characteristics:
- Toxicity/Persistence
- Hazardous Waste Quantity

Targets:
- Nearest Intake
- Population
- Resources

+

Human Food Chain Threat

Waste Characteristics X **Targets**

Waste Characteristics:
- Toxicity/Persistence/Bioaccumulation
- Hazardous Waste Quantity

Targets:
- Food Chain Individual
- Population

+

Environmental Threat

Waste Characteristics X **Targets**

Waste Characteristics:
- Ecosystem Toxicity/Persistence/Bioaccumulation
- Hazardous Waste Quantity

Targets:
- Sensitive Environments

BILLING CODE 6560-50-C

EPA is also concerned that many qualities of recreation areas (e.g., uniqueness, attractiveness, value) cannot be readily quantified or measured, which poses significant problems for a screening tool. Therefore, the recreational use threat has been removed from the final rule. Instead, factors related to recreational use are being included in the assessment of resource factors in the air, surface water, and ground water migration pathways. (See the discussion of resources factors above and §§ 3.3.3, 4.1.2.3.3, 4.2.2.3.3, and 6.3.3 of the rule.) Recreational use is also a major component of the evaluation of the attractiveness/accessibility factor in the soil exposure pathway (see § 5.2.1.1 of the rule).

Human food chain. SARA requires that EPA consider "the damage to natural resources which may affect the human food chain * * *." Accordingly, the surface water migration pathway of the proposed rule included evaluation of threats to human health via the aquatic food chain.

A number of commenters suggested that terrestrial food chain threats should also be evaluated because most of the food eaten in the United States originates on land, and the terrestrial human food chain is, therefore, more important than the aquatic human food chain. Commenters specifically stated that the HRS should account for human food chain threats involving irrigated crops, livestock, and game animals. One commenter stated that the SARA mandate would not be fulfilled if only aquatic human food chain threats were evaluated.

After conducting an investigation into possible methods, EPA determined that it would not be practical to include a separate evaluation of terrestrial human food chain threats in the HRS. The terrestrial food chain is more complex and site-specific and is less understood than the aquatic food chain, and its assessment requires considerably more data. These factors render evaluation of the relative risks associated with the terrestrial human food chain well beyond the capability of a screening system such as the HRS. The final rule, therefore, does not separately evaluate terrestrial human food chain threats. These threats are, however, considered indirectly under the resources target components in the air migration pathway, ground water migration pathway, soil exposure pathway, and drinking water threat portion of the surface water migration pathway.

The proposed rule required the estimation of bioaccumulation potentials for hazardous substances posing threats via the human food chain. One commenter stated that the estimation of bioaccumulation potentials requires excessive time and resources, and that this step should be dropped from the HRS.

EPA disagrees and considers the bioaccumulation potentials of hazardous substances to be among the most important factors determining the degree of human health threat posed by substances via the human food chain. Substances that do not bioaccumulate pose less of a threat via the human food chain than substances that bioaccumulate, all else being equal. Conversely, substances with high bioaccumulation potentials can pose very significant threats via the human food chain even if they are only moderately toxic, or are present in modest quantities. EPA believes that compiling bioaccumulation potential tables will reduce the effort and resources required to score this factor.

EPA received several comments stating that bioaccumulation potential was not given sufficient weight in the evaluation of human food chain threats. EPA evaluated the use of bioaccumulation potential during the field test and determined that there was considerable uncertainty related to this factor, in part because of major differences in uptake associated with different species in different environments. In addition, bioconcentration values have been computed for only a few species for most substances. In light of this uncertainty, EPA decided that bioaccumulation potential should not be given additional weight in the HRS. In addition, as part of the structural changes discussed in Section III B, the bioaccumulation potential factor was moved from the targets factor category to the waste characteristics factor category so that it is evaluated consistently with the other waste characteristics factors that reflect exposure. As part of these changes, the use of the bioaccumulation potential factor in selecting the substance posing the greatest hazard also has been modified.

The final rule broadens the definition of actual contamination of the human food chain by modifying one criterion and adding a new criterion defining actual contamination. The proposed rule defined a fishery as actually contaminated if (1) the fishery was closed as a result of contamination and a substance for which the fishery was closed had been documented in an observed release from the site, or (2) a tissue sample from a human food chain organism from the fishery was found to contain a hazardous substance at a concentration level exceeding the FDAAL for that substance in fish tissue and the substance had been documented in an observed release from the site. In both cases, at least a portion of the fishery must be within the boundaries of the observed release.

Under the final rule, the former criterion (closed fishery) remains essentially unchanged. The latter criterion (tissue contamination) has been modified: A fishery is considered actually contaminated if the concentration of a hazardous substance in tissue of an essentially sessile benthic human food chain organism from the watershed is at a level that meets the criteria for an observed release from the site and at least a portion of the fishery is within the boundaries of the observed release. A new criterion has also been added: A fishery is considered actually contaminated if a hazardous substance having a bioaccumulation potential factor value of 500 or greater either is present in an observed release established by direct observation or is present in a surface water or sediment sample at a level that meets the criteria for an observed release from the site and at least a portion of the fishery is within the boundaries of the observed release. Only the portion of a fishery within the boundaries of an observed release is considered actually contaminated.

EPA broadened the definition of actually contaminated fisheries on the basis of field test results. With the more narrow definition in the proposed rule, few actually contaminated fisheries were identified because:

(1) Closed fisheries did not exist at most sites;

(2) Hazardous substance concentration data from tissues of applicable organisms were available for only a small portion of fisheries; and

(3) FDAALs exist for only a relatively small number of hazardous substances.

The final rule also introduces two levels of actually contaminated fisheries or portions of fisheries:

- Level I: Applicable when concentrations of site-related hazardous substances meeting the criteria for actual contamination of the fishery equal or exceed the benchmark concentration levels established in the final rule based on FDAALs, screening concentrations corresponding to elevated cancer risks, and screening concentrations corresponding to elevated chronic, non-cancer toxicity risks via oral exposures. The final rule allows Level I contamination to be established based on hazardous substance concentrations in tissue samples from "organisms other than essentially sessile benthic organisms" (e.g., fish, lobsters, crabs), even though these organisms cannot be used to establish observed releases or actual contamination.

• Level II: Applicable to all actually contaminated fisheries (or portions of actually contaminated fisheries) not meeting Level I criteria.

The final rule assigns human food chain populations associated with Level I concentrations tenfold greater weight than those associated with Level II concentrations. The final rule also describes the procedures for determining, where applicable, the part of a fishery subject to Level I concentrations, the part subject to Level II concentrations, and/or the part subject to potential contamination.

EPA received several comments suggesting that, to be consistent with the other threats, a maximally exposed individual factor should be incorporated into the human food chain threat. The Agency agrees, and to provide this consistency the final rule incorporates a maximally exposed individual factor (the food chain individual) into the human food chain targets factor category. As with similar factors in other pathways and threats, the food chain individual is assigned points according to the level of contamination. Where actual contamination of a fishery is documented, the food chain individual factor is assigned 50 points for Level I and 45 points for Level II concentrations. Where no actual contamination of a fishery is documented, but there is documentation of an observed release of a hazardous substance having a bioaccumulation potential factor value of 500 or greater to a watershed containing a fishery within the target distance limit, the food chain individual is assigned a value of 20 points. Where there are no observed releases to surface water or no observed release of a hazardous substance with a bioaccumulation potential factor value of 500 or greater, but a fishery is present (i.e., there is a potentially contaminated fishery) within the target distance limit, the food chain individual is assigned points ranging from 0 to 20, depending on the dilution weight assigned to the associated surface water body.

The proposed rule estimated human food chain production of actually contaminated or potentially contaminated fisheries based on harvest data or stocking data for those fisheries, if available. Where such data were not available, production estimates were based on productivity of the surface water body or the estimated standing crop of aquatic biota in the fisheries. The proposed rule included a table of standing crop default values for estimating human food chain production of the fishery.

EPA received numerous comments to the effect that the standing crop default table was difficult to use, provided several different values for some water bodies and none for others, and provided unreliable data. Several commenters stated that standing crop values are not an appropriate basis for estimating aquatic human food chain production. One commenter pointed out that standing crop estimates do not correlate well with harvest for various water body types. Another commenter stated that estimates of harvest from fish and game officials are preferable to standing crop default values because standing crop is a measure of biomass (weight of all edible living organisms in the water body) rather than productivity.

EPA agrees with the commenters. In the final rule, estimates of fishery human food chain production are based on fish harvest data (including stocking data) as opposed to standing crop data. When site-specific data are not available, harvest rates are to be estimated based on the average harvest per unit area for the particular water body type under assessment and the geographic area in which the water body is located.

Ground water discharge to surface water. A number of commenters and field test participants suggested that the HRS should consider the potential impact of ground water discharges to surface water because contaminated ground water can be a significant source of surface water contamination. Field test participants noted that some sites have no overland flow route, but surface water can be contaminated through ground water discharges.

EPA agrees and has added a ground water to surface water migration component to the surface water migration pathway. Figure 7 shows the structure of this component. The surface water migration pathway, therefore, now includes two components: The overland flow/flood migration component, which retains the structure of the surface water migration pathway as proposed (except for the changes discussed in this preamble), and the new ground water to surface water migration component. Either or both components may be scored; if both are scored, the surface water migration pathway score is the higher of the two scores. EPA selected the higher of the two scores rather than combining them because, if scores were combined, the amount of hazardous substances at the site available to migrate via each component would have to be apportioned between the two components. The site-specific data needed to determine the appropriate apportionment are rarely available.

BILLING CODE 6560-50-M

Figure 7

Surface Water Migration Pathway - Ground Water to Surface Water Component[1]

FINAL HRS

Likelihood of Release X **Drinking Water Threat**

Likelihood of Release
Observed Release or Potential to Release Containment Net Precipitation Depth to Aquifer Travel Time

Drinking Water Threat

Waste Characteristics	X	Targets
Toxicity/Mobility/Persistence Hazardous Waste Quantity		Nearest Intake Population Resources

\+

Human Food Chain Threat

Waste Characteristics	X	Targets
Toxicity/Mobility/Persistence/ Bioaccumulation Hazardous Waste Quantity		Food Chain Individual Population

\+

Environmental Threat

Waste Characteristics	X	Targets
Ecosystem Toxicity/Mobility/ Persistence/Bioaccumulation Hazardous Waste Quantity		Sensitive Environments

New component.

BILLING CODE 6560-50-C

The ground water to surface water migration component evaluates three threats: drinking water, human food chain, and environmental. The component is scored only if: (1) A portion of the surface water is within one mile of any source at the site that could release to ground water; (2) there is no discontinuity in the uppermost aquifer between the source and the portion of the surface water within one mile of the source; and (3) the bottom of the surface water is at or below the top of the aquifer. The target distance limit for the component is determined the same way as for the overland flow/flood component. For each threat, likelihood of release is based on either observed release or potential to release. An observed release is established if, and only if, there is an observed release to the uppermost aquifer, while potential to release is based on ground water potential to release factors, except that only the uppermost aquifer is considered. (See § 4.2.2.1.2.)

The hazardous waste quantity factor is scored in the same way it is scored for the overland flow/flood migration component, except that only sources that could release to ground water are considered (see § 4.2.2.2.2). Toxicity, ground water mobility, and surface water persistence are considered in selecting the substance potentially posing the greatest hazard in drinking water (see § 4.2.2.2.1). By considering ground water mobility, the final rule reflects the fraction of a hazardous substance expected to be released from the sources and to migrate through ground water to the surface water body. For human food chain and environmental threats, bioaccumulation (or ecosystem bioaccumulation) potential is also considered in selecting the substance potentially posing the greatest hazard (see § 4.2.3.2.1).

The targets factors in this component are evaluated in the same way as targets factors in the overland flow/flood migration component, except that a dilution-weight adjustment is combined with the surface water dilution weights for populations potentially exposed to contamination. The dilution-weight adjustment was added because the HRS assumes that hazardous substances migrate via ground water in all directions from a site. Under this assumption, except in those instances where the surface water body completely surrounds the site, only a portion of the hazardous substances can be assumed to reach the surface water through the ground water. The dilution-weight adjustment accounts for the portion of the hazardous substances assumed to be available to migrate to surface water through ground water. The probable point of entry is defined as the shortest straight-line distance, within the aquifer boundaries, from the sources at the site to the surface water body. Therefore, the actual targets considered may differ somewhat from targets evaluated in the overland flow/flood migration component because the two probable points of entry may differ. This approach might allow evaluation of intakes, fisheries, and sensitive environments that may be exposed to contamination from a site but are upstream from the point of overland flow entry.

N. Soil Exposure Pathway

The onsite exposure pathway, which was added to the HRS in the proposed rule, has been renamed the soil exposure pathway in the final rule. The pathway was primarily designed to assess the potential threats posed by direct exposure to wastes and contaminated surficial materials at a site. It evaluated two threats—the resident population and the nearby population. In the proposed rule, the resident population threat included three types of targets: High risk population on a property with observed contamination, all other residents and people attending school or day care on a property with observed contamination, and terrestrial sensitive environments in which there is observed contamination. The nearby population was based on people who live or attend school within a one-mile travel distance and who did not meet the criteria for resident population. Figure 8 summarizes the proposed and final rules.

A number of commenters supported the inclusion of the pathway, but raised issues related to its evaluation. For example, commenters objected to evaluating the waste characteristics factor category solely on toxicity. Three commenters objected to limiting the high risk population to children under seven. Other commenters stated that collecting data on the high risk population would be difficult. A number of commenters questioned how the onsite area and area of contamination would be defined and how accessibility of the site was evaluated.

In response to these comments and to the field test results, EPA has made a number of changes to the soil exposure pathway. The name of the pathway has been changed to be more consistent with terminology used in the Superfund human health evaluation process.

As suggested by commenters, the final rule limits the area within which human targets are evaluated for the resident population threat to locations within property boundaries and within a distance limit of 200 feet from an area of observed contamination. The 200-foot limit accounts for those situations where the property boundary is very large, and exposure to contaminated surficial materials is unlikely or infrequent because of the distance of residences, schools, or work places from an area of observed contamination on the same property.

To make the pathway consistent with the other pathways and in response to comments, the final rule includes hazardous waste quantity in the waste characteristics factor category and multiplies it by the factor value for toxicity. New factors, resident individual and nearby individual, have been added to make the pathway consistent with the other pathways, all of which assign values for the maximally exposed individual (e.g., nearest individual or intake). Population is evaluated using two levels of actual contamination based on health-based benchmarks. Separate consideration of the high risk population (children under seven) has been eliminated because the field test indicated that this factor could greatly add to the time and expense of scoring a site yet resulted in little discrimination among sites. This change also makes the soil exposure pathway more consistent with the other pathways.

In the nearby population threat, the hazardous waste quantity factor in the likelihood of exposure factor category has been renamed "area of contamination" to reflect both the intent of the factor and how it is evaluated. The accessibility/frequency of use factor has been revised and renamed the "attractiveness/accessibility" factor. The revised factor emphasizes recreational uses of areas of observed contamination because they are most likely to result in exposures to contaminated surficial materials. In addition, the weighting of the nearby population relative to the resident population has been reduced to better reflect the relative levels of exposure for those threats.

A number of commenters questioned whether workers should be counted when evaluating target populations in the soil exposure pathway. One commenter suggested that soil exposure scoring should "not include activities at facilities that presently are regulated under the Occupational Safety and Health Administration (OSHA)." Other commenters, however, stated that workers should be counted in the target population. One commenter argued that not counting a facility's work force is inconsistent with other population counting techniques. Another commenter said that workers should be included in the resident population because the proposed method of calculating soil exposure pathway scores can result in inappropriately low scores when onsite workers are exposed to wastes or contaminated soil.

In response to these comments, the Agency investigated statutory, regulatory, and policy conditions that might restrict the inclusion of workers in the target population for the soil exposure pathway. This analysis found no broad statutory or regulatory authority for excluding workers covered by OSHA regulations from consideration as targets in the HRS. Although the definition of a release under CERCLA section 101(22) excludes "any release which results in exposure to persons solely within a workplace * * *" it only does so for purposes of claims by workers who are already covered by State worker compensation laws. The legislative history of section 101(22) specifically anticipated that authority under CERCLA might, in appropriate cases, be used to respond to releases within a workplace. Thus, the Agency concludes that there are no broad statutory or regulatory restrictions against consideration of activities at OSHA-regulated facilities.

BILLING CODE 6560-50-M

Figure 8

Soil Exposure Pathway

PROPOSED HRS

Resident Population Threat

Likelihood of Exposure	X	Waste Characteristics	X	Targets
Observed Contamination		Toxicity		High Risk Population Total Resident Population Terrestrial Sensitive Environments

+

Nearby Population Threat

Likelihood of Exposure	X	Waste Characteristics	X	Targets
Waste Quantity Accessibility/Frequency of Use		Toxicity		Population Within 1 Mile

FINAL HRS

Resident Population Threat

Likelihood of Exposure	X	Waste Characteristics	X	Targets
Observed Contamination		Toxicity Hazardous Waste Quantity		Resident Individual Resident Population Workers Resources Terrestrial Sensitive Environments

+

Nearby Population Threat

Likelihood of Exposure	X	Waste Characteristics	X	Targets
Attractiveness/Accessibility Area of Contamination		Toxicity Hazardous Waste Quantity		Population Within 1 Mile Nearby Individual

BILLING CODE 6560-50-C

The soil exposure pathway is designed to account for exposures and health risks resulting from ingestion of contaminated surficial materials. Because ingestion exposures are comparable for some types of workers and residents, the Agency has decided to include workers in the resident population threat. However, substantial variability in the kinds of workers and work activities at sites (e.g., indoor and outdoor) leads to considerable variability in exposure potential. The Agency believes that determining specific categories or types of workers is beyond the scope of HRS data collection. Thus, workers are assigned target points on a prorated basis: 5 points are assigned for sites with up to 100 workers; 10 points for sites with 101 to 1,000 workers, and 15 points for greater than 1,000 workers. Prorating workers will reduce the data collection effort. Evaluation of workers is not affected by health-based benchmarks. (See § 5.1.3.3.) Nearby workers are not counted in the nearby population because the Agency considers it unlikely that workers from nearby workplaces would regularly visit contaminated areas outside the property boundary of their workplace during the workday, and because there is no way to estimate accurately the number of workers who might.

O. Air Migration Pathway

The proposed rule made several significant changes to the air migration pathway in the original HRS. In response to the SARA mandate to consider potential as well as actual releases to air, the proposed rule included an evaluation of the potential to release. The proposed rule also added a mobility factor to the waste characteristics factor category and an MEI factor to the targets category. Finally, the proposed rule added explicit distance weighting factors for evaluating all factors in the targets category. Figure 9 shows the proposed air migration pathway and the final rule pathway.

The public provided numerous comments on these changes and raised new issues as well. The most significant new issue concerned the structural inconsistency in the treatment of gases and particulates in the proposed air migration pathway. For example, commenters observed that in the potential to release evaluation, it was possible to assign a high containment value to a source with good gas containment and poor particulate containment while assigning high source type and mobility values based on the presence of gaseous hazardous substances. This combination would yield an inappropriately high potential to release value. This concern was also noted in discussions with field test personnel.

The Agency agrees with these commenters and investigated methods to better reflect the differences between gases and particulates. As a result of these analyses, EPA has made several changes to the final rule in both the likelihood of release and waste characteristics factor categories.

In the likelihood of release factor category, the final rule evaluates source potential to release separately for gases and particulates. Only those sources containing gaseous hazardous substances are evaluated for gas potential to release, and only those sources containing hazardous substances that can be released as particulates are evaluated for particulate potential to release. This change in potential to release structure necessitated other changes in the scoring of potential to release including development of separate gas and particulate source type factors and migration potential factors. The names of these latter factors were also changed to highlight the differences between potential to release "mobility" and waste characteristics "mobility." (See §§ 6.1.2.1.3, 6.1.2.2.3.)

BILLING CODE 6560-50-M

Figure 9

Air Migration Pathway

PROPOSED HRS

Likelihood of Release	X	Waste Characteristics	X	Targets
Observed Release or Potential to Release Source Containment Source Type Source Mobility		Toxicity/Mobility Hazardous Waste Quantity		Maximally Exposed Individual Population Land Use Sensitive Environments

FINAL HRS

Likelihood of Release	X	Waste Characteristics	X	Targets
Observed Release or Potential to Release Gas Gas Containment Gas Source Type Gas Migration Potential Particulate Particulate Containment Particulate Source Type Particulate Migration Potential		Toxicity/Mobility Hazardous Waste Quantity		Nearest Individual Population Resources Sensitive Environments

BILLING CODE 6560-50-C

In addition to these changes in the basic structure of the potential to release factors, the final rule includes several additional changes in the source type list, migration potential factors, and containment factors. Based on the experience gained in the field test, EPA added several source types to the source type list. Some of these additions (e.g., surface impoundment (not buried/backfilled): dry) simply clarify classifications that were implied in the proposed source type list. Other additions, such as source types involving biogas release, were considered early in the development of the proposed HRS but were not included originally in the interest of simplicity. Field test experience, however, indicated that their inclusion in the final rule was necessary. Finally, new distinctions within some source types (e.g., the various types of piles) were added partly in response to comments and partly as a result of field test experience. As applicable, source type values were also revised. (See §§ 6.1.2.1.2, 6.1.2.2.2 and Table 6-4.)

The revised gas and particulate migration potential factors are very similar to the proposed likelihood of release gas and particulate mobility factors. Several commenters questioned the need for including dry relative soil volatility in the final gas migration factor. A simplification analysis indicated that dry relative soil volatility was redundant, as it was almost completely determined by vapor pressure. Hence, the final gas migration potential factor includes only vapor pressure and Henry's law constant. The particulate migration potential factor in the final rule is simply the particulate component of the proposed potential to release mobility factor.

The containment factors were also changed as a result of the field test, a review of recent information on covering systems, the examination of air release rate models, and the public comments on the need for simplicity in the final rule. The final list of containment descriptions eliminated many redundant descriptions and changed others, retaining only those distinctions that are necessary based on type of source. (See §§ 6.1.2.1.1, 6.1.2.2.1 and Tables 6-3, 6-9.) As discussed in Section III F above, two new mobility factors were developed for the waste characteristics factor category.

Commenters generally supported the concept of distance weighting target factors. However, several disagreed with the approach used to develop the proposed factor values. Some commenters suggested basing the factor values on long-term meteorology and the size of the site, while others suggested that additional atmospheric phenomena (e.g., particulate deposition) be reflected in the final values. As a result of these comments, EPA has revised the distance weighting factors used in the final rule to reflect long-term atmospheric phenomena. Analyses indicated that particulate deposition and other similar phenomena as well as site size were not sufficiently significant within four miles of a site to warrant their inclusion in the final factor values. EPA also notes that the distance weighting factor values are now incorporated in the population factor value table. (See § 6.3.2.4 and Table 6-17.)

P. Large Volume Wastes

Mining waste sites. A number of commenters representing mining companies, trade associations, and State and Federal agencies commented on how the proposed HRS would score mining waste sites; commenters representing waste management facilities raised similar issues in regard to their sites. This section summarizes and addresses the major issues addressed by these commenters.

Commenters raised several concerns regarding the appropriate consideration of background levels of metals in documenting direct or indirect releases from mining waste sites. One commenter recommended that in determining direct releases from a mining waste site, EPA should consider the natural characteristics of the site prior to mining and the changes in migration rates resulting from mining. The commenter explained that the concentration of metals in a mining waste pile may be similar to or less than natural concentrations in soil or rocks below and adjacent to the pile. To document indirect releases, the commenter suggested that EPA require collection of detailed information on site geology and hydrological gradients to ensure proper consideration of background levels. Finally, the commenter asserted that although it is appropriate to weight observed releases more heavily than potential releases at sites with synthetic organic hazardous substances, the criteria used to define observed release are not valid at sites with natural sources of metals. Another commenter agreed and suggested that because of background levels of inorganic elements, the proposed HRS could identify as an observed release concentrations unrelated to mining activities.

EPA recognizes that natural background concentrations of metals in soil or rocks can affect the measured concentration necessary to establish an observed release at a mining waste site. This consideration is reflected in the requirement that concentrations significantly above background be shown to establish an observed release. Moreover, EPA has clarified the observed release criteria in the final rule to explain that they specify minimum differences necessary to establish an observed release by chemical analysis.

Several commenters questioned the treatment of metals in the ground water mobility factor. One commenter stated that the proposed HRS is biased against mining waste sites because it gives greater consideration to the accurate assessment of the mobility of organic substances than to that of naturally occurring metals. The commenter noted that the proposed persistence factor for the surface water migration pathway accounts for the degradation of hazardous substances in the environment through four processes. None of these processes, according to the commenter, applies to metallic elements, which received a default value of 3 (the highest possible score for persistence). Another commenter stated that decreased mobility was considered only for organic compounds, even though inorganic compounds are immobile in some situations.

One commenter stated that adding a metals mobility factor, as EPA's Science Advisory Board (SAB) recommended, would allow the HRS to reflect more accurately the potential for metallic elements to migrate in the aqueous phase. Two commenters were concerned that metals would be assigned a "worst-case" default value for mobility. On the other hand, another commenter stated that consideration of the mobility of metals in the revised HRS would at least partially rectify the bias in the current HRS against high-volume, low-concentration mining wastes.

A number of these commenters appear to have misunderstood the proposed rule. Metals were not automatically assigned the maximum value as a default in the ground water mobility factor, but rather were assigned values based on their coefficient of aqueous migration. The final rule automatically assigns the maximum value for mobility only to metals establishing an observed release by chemical analysis, which is the same way organics and nonmetallic inorganics are evaluated. For metals and metal compounds not establishing an observed release by chemical analysis, mobility is based on water solubility and distribution coefficient (K_d), the same as for organics and nonmetallic inorganics. If none of the hazardous substances (including metals, organics, and nonmetallic inorganics) eligible to be evaluated for the site can be assigned a mobility factor value based on available data, § 3.2.1.2 of the final rule assigns a mobility factor value of 0.002 for all of the hazardous substances. This value was selected based on a review of the range of mobility factor values assigned to those hazardous substances (including metals) for which data were available for assigning mobility factor values. The value of 0.002 is clearly not a worst-case default (which would be 1.0).

EPA believes that the persistence factor is not biased against metals. Elemental metals do not degrade and, therefore, should receive higher scores for persistence than other substances subject to degradation processes.

One commenter claimed that the soil exposure pathway is likely to bias the HRS scores of mining waste sites toward higher values because such sites contain large volumes of waste covering large surface areas, and because of geographic factors, these large areas are seldom secured against direct public access. In addition, according to the commenter, the public may be attracted to mining waste sites. The commenter suggested that the soil exposure pathway incorrectly assumes there is an exposure because there is access to mining waste sites.

EPA does not agree that the soil exposure pathway is biased against mining waste sites. The pathway evaluates exposures of people via contact with surficial hazardous substances. The Agency believes that, all else being equal, large contaminated surface areas with public access, including those associated with mining waste sites, should receive higher scores for the soil exposure pathway than smaller sites with more restricted access. Even sites with large contaminated surface areas are unlikely to be assigned high scores except when they are near residential areas or include a listed sensitive environment. As some commenters representing mining-related activities have noted in the past, most mines are located some distance from inhabited areas.

Three commenters stated that the original HRS was biased against sites such as mining waste sites that are characterized by high volumes of waste with relatively low concentrations of toxic constituents. Two of these commenters suggested that mining wastes would be appropriate for hazardous constituent quantity determination because such wastes are relatively homogeneous (compared to other wastes) and, therefore, have fairly consistent concentrations. One of these two commenters also stated that the hazardous waste quantity factor equations in Table 2-14 of the proposed rule should be revised to be less conservative. The remaining commenter suggested that the proposed HRS was still biased against mining waste sites because they are still scored based on the quantity of waste rather than on the concentration of the waste at the point of exposure.

EPA does not agree that the HRS is biased against high-volume, low-concentration waste sites. The final rule incorporates concentration data in three factors: (1) Likelihood of release (concentration data can be used for establishing an observed release); (2) hazardous waste quantity (concentration data, if available and adequate, can be used for calculating hazardous constituent quantity); and (3) targets (concentrations of hazardous substances present in drinking water wells or at other exposure points can be used to determine weightings for nearest individuals (or wells or intakes), populations, and sensitive environments factors). EPA has not explicitly required concentration data for all sites because of the substantial costs for obtaining these data and the very high degree of uncertainty associated with data collected during SIs.

EPA requested that the SAB review issues related to large-volume waste sites before the NPRM was published. The SAB final report is available in the CERCLA docket. Two commenters stated that the Agency did not adequately consider the SAB's recommendations for revising the HRS, specifically those concerning the use of mobility data.

The SAB, in its review of the original HRS, examined whether large-volume waste sites (e.g., mining waste sites) had been treated differently than other waste sites and concluded that insufficient data were presented to demonstrate that the original HRS was biased against mining waste sites. However, the SAB noted that the original HRS had the potential for such a bias, particularly when scoring potential to release, because the original HRS did not consider mobility, concentration of hazardous constituents, and transport. The SAB suggested several possible modifications to improve the application of the HRS to mining waste sites.

Based in part on the SAB suggestions, EPA proposed several changes to the overall scoring process to make the HRS more accurately reflect risks associated with mining waste sites, notably, addition of a mobility factor to the air and ground water migration pathways, changes in the persistence factor, incorporation of a tiered hazardous waste quantity factor that can account for waste concentration data, and addition of health-based benchmarks for evaluating population. As explained in the NPRM, determining speciation of metals and pH, as the SAB had suggested, is not feasible given the temporal and spatial variations at hazardous waste sites and the limitations on SI data collection. Moreover, determining speciation is not feasible for most substances given EPA's current analytical procedures; requiring speciation analyses would add substantially to the cost of data collection.

Two commenters stated that the proposed HRS can significantly overestimate risks associated with mining waste sites that consist of high-volume, low-concentration wastes. One of these commenters recommended a "preliminary evaluation system" to more accurately reflect the actual risks associated with such sites and remove any bias in the HRS relative to other types of sites. This commenter also suggested that in proposing the HRS revisions, EPA had ignored the results of its own studies under RCRA sections 3001 and 8002, which the commenter believed to be more focused efforts to quantify risks from mining waste sites than the HRS revisions.

EPA does not believe that a separate "preliminary evaluation system" for scoring mining waste sites would be appropriate. A single HRS can be applied uniformly to all sites, allowing the Agency to evaluate sites relative to each other with respect to actual and potential hazards. The Agency examined the RCRA studies cited by the commenter before proposing HRS revisions. Those studies, which focus on the management of wastes at active facilities, concluded that many special study waste sites (e.g., mining) do not present very high risks, while others may present substantial risks. EPA believes that the conclusions of these studies and the Agency's subsequent regulatory determinations (i.e., not to regulate most mining wastes under RCRA Subtitle C) are not inconsistent with a determination that some mining waste releases can require Superfund response actions. Furthermore, the HRS is designed so that it can be applied to closed and abandoned sites as well as active sites.

Other large volume waste sites. Several commenters suggested that the proposed HRS did not meet CERCLA section 125 requirements for sites involving fossil fuel combustion wastes. These commenters generally agreed that section 125 requires EPA to consider the quantity and concentration of hazardous constituents in fossil fuel combustion wastes and that the proposed HRS had not adequately addressed this requirement.

One commenter supported the Agency's proposal to allow consideration of concentration data when such data are available. Three commenters stated that the proposed HRS would often assign fossil fuel combustion waste sites high scores in part because of the worst-case assumptions or "default values" for certain factors (i.e., hazardous waste quantity, toxicity, target populations). The commenters claimed that fossil fuel combustion waste sites receive high scores merely because of the large quantity of waste, although this waste presents no significant adverse environmental effects, and that these high scores are inconsistent with EPA's findings in the RCRA section 8002 study. One of the three commenters suggested that the proposed HRS retained certain deficiencies of the original HRS, such as assuming that all hazardous substances in the waste consist of the single most toxic constituent in the waste.

EPA does not believe that the approach taken in the final rule creates a bias against fossil fuel combustion wastes. Partly because concentration data are considered in the final rule, fossil fuel combustion waste sites are not expected to score disproportionately high when compared with other types of sites. The HRS assumes that it is not possible to determine in a consistent manner the relative contribution to risk of all hazardous substances found at sites. Given this assumption, EPA has determined that basing the toxicity of the combination of substances at a site on the toxicity of the substance posing the greatest hazard is a reasonable and appropriately conservative approach. In many cases, the substance posing the greatest hazard is not several orders of magnitude more toxic than other hazardous substances at the site. Therefore, the effect of this approach on the toxicity factor value—which is evaluated in one order of magnitude scoring categories—is not as great as some commenters have suggested (see also section III D). In addition, as noted above, worst-case defaults are not assigned for mobility; population factors have no default values.

Two commenters suggested that because CERCLA section 125 contains no statutory deadlines, EPA should take as much time as necessary to adequately respond. These commenters recommended that EPA extend the tiered approach of the hazardous waste quantity factor to other factors to take advantage of the extensive data on fossil fuel combustion wastes generated by the electric utility industry.

The Agency does not agree that the tiered approach used in the hazardous waste quantity factor should be extended to other factors for fossil fuel combustion waste sites (see also section III K). EPA believes that creating a separate HRS to score certain types of sites would not allow the Agency to provide a uniform measure of relative risk at a wide variety of sites, as Congress intended.

One commenter recommended that EPA consider using fate and transport models currently under development to incorporate quantitative representations of specific processes and mechanisms into the HRS. EPA carefully examined this possibility and concluded that although the use of fate and transport models could conceivably increase the accuracy of the HRS for some pathways, collection of the required site-specific data would be far too complex and costly. Fate and transport models are appropriate for a comprehensive risk assessment, but not for a screening tool such as the HRS. In addition, EPA's review suggested that it would be more difficult to achieve consistent results among users of such models than with the HRS. EPA points out that it used fate and transport models to develop the distance weighting factors used in the HRS target calculations, and also that the HRS incorporates several hazardous substance parameters (e.g., mobility) and site parameters (e.g., travel time) that are components of fate and transport models.

Two commenters expressed concern that the proposed HRS fails to account for the leachability of hazardous constituents as required by CERCLA section 125. According to the commenters, some hazardous constituents pose no risk via ground water because they will never be released to that medium. Thus, even if hazardous waste quantity and concentration are considered adequately, hazardous waste quantity scores for fossil fuel combustion sites will be erroneously high unless leachability is considered as well.

EPA examined the availability of leachate data and the feasibility of using such data for calculating hazardous substance quantity for all types of sources and wastes. The Agency decided against using leachate concentrations because:

- Leachate data are not available for all sources and wastes, and available leachate data on high-volume wastes and some landfills have limited applicability for estimating the quantity of leachable hazardous substances;
- Leachate data derived from lab studies are limited and do not realistically represent the universe of field conditions such as heterogeneity of wastes, chemistry of leachate, and density and pore volume of disposed wastes; and
- Any method for using leachate data could not be consistently or uniformly applied to all sites.

EPA also examined the feasibility of developing site-specific leachate data for estimating leachable hazardous substance quantity for the ground water migration pathway. EPA decided against this option because reliable estimation of leachable hazardous substance quantity requires comprehensive sampling of site-specific heterogeneous waste, which would be prohibitively expensive and not feasible. In some cases, such sampling would be technically unfeasible and unsafe.

EPA evaluated alternatives for developing a surrogate for estimating leachable hazardous substance quantity. The Agency found that adding the mobility factor to the ground water migration pathway, based both on solubilities and distribution coefficients (K_ds) of hazardous substances, and multiplying it by the hazardous waste quantity factor would be a feasible alternative for approximating the fraction of hazardous substance quantity expected to be released to ground water.

Q. Consideration of Removal Actions (Current Versus Initial Conditions)

The original HRS based the evaluation of factors on initial conditions. In the preamble to the proposed rule, EPA specifically requested comments on whether sites should be scored on the basis of initial or current conditions. The principal question is whether the effect of response actions, such as the removal of some quantity of the waste, should be considered when sites are scored. Initial conditions are defined by the timing of the response action; that is, initial conditions are the conditions that existed prior to any response action. For sites where no response action has occurred, initial and current conditions are the same for evaluating sites.

Of the 25 commenters responding to this issue, 15—including all industry commenters—supported scoring on current conditions. In the preamble of the proposed rule, EPA presented two approaches for considering response actions in HRS scores: (1) Consider these actions only for those pathways and factors for which they are most appropriate; and (2) consider these actions in all pathways, but make exceptions at sites where initial conditions more accurately reflect risks.

Those who stated a preference favored the second, specifying that the exceptions should be clearly defined in the final rule. These commenters stated that scoring all pathways on current conditions would encourage responsible parties to clean up sites quickly. They reasoned that if cleanups are delayed, the threat of migration of the hazardous substances increases; therefore, scoring on current conditions is consistent with the intent of CERCLA because it encourages rapid remedial action. One commenter said that scoring on initial conditions made little sense when, as a result of the cleanup, the level of residual contamination was below the level required by CERCLA.

Several proponents of scoring on current conditions stated that EPA's concern that responsible parties would clean up sites just enough to avoid being listed on the NPL was unfounded. They argued that the proposed scoring system is too complicated to manipulate, and that predicting the effect of partial cleanups on the final score would be difficult. Others suggested that where contamination remains, sampling during an SI will discover it.

Ten commenters did not fully support scoring on current conditions. Only one opposed any consideration of current conditions. Several commenters supported scoring the soil exposure and air migration pathways on current conditions. Others stated that response actions should be considered only when the actions are conducted under Federal or State direction, or when the action constitutes a complete cleanup. Several added that State actions should not be considered because it would penalize States with active remedial programs. One commenter suggested scoring sites on both current and initial conditions; if the response action had addressed all hazards, then the current conditions score should be used.

Based on public comment, EPA has decided to change its policy on consideration of removal actions. The Agency agrees that consideration of such actions in HRS scores is likely to increase incentives for rapid actions by responsible parties, reducing risks to the public and allowing for more cost effective expenditure of the Fund. In making this decision, EPA tried to balance the benefits of considering removal actions in HRS scores (e.g., increased incentives for rapid actions) while also ensuring that the HRS score reflects any continuing risks at sites where contamination occurred prior to any response action.

Therefore, EPA will calculate waste quantities based on current conditions. However, EPA believes the accuracy of this approach depends on being able to determine with reasonable confidence the quantity of hazardous constituents remaining in sources at the site and the quantity released into the environment. As a consequence, where the Agency does not have sufficient information to estimate the quantity of hazardous constituents remaining in the sources at the site and in the associated releases, a minimum factor value may be assigned to the hazardous waste quantity factor value. Thus, removal actions may not reduce waste quantity factor values unless the quantity of hazardous constituents remaining in sources and in releases can be estimated with reasonable confidence.

In addition to providing incentives for early response, this approach also provides incentives for potentially responsible parties to ascertain the extent of the remaining contamination at sites. Potentially responsible parties undertaking removal actions will have the primary responsibility for collecting any data needed to support a determination of the quantity of hazardous constituents remaining. EPA expects responsible parties may need to conduct sampling and analyses to determine the extent of hazardous substance migration in soils and other media in order to estimate with reasonable confidence the quantity of hazardous constituents remaining.

EPA decided not to limit the consideration of response actions to certain pathways (e.g., the soil exposure pathway) because this would overstate the risk at sites where removal of wastes has eliminated threats in all pathways. Moreover, a more limited approach to consideration of response actions would provide less incentive for rapid response action.

EPA will evaluate a site based on current conditions provided that response actions actually have removed wastes from the site for proper disposal or destruction in a facility permitted under the Resource Conservation and Recovery Act (RCRA), the Toxic Substances Control Act (TSCA), or by the Nuclear Regulatory Commission. HRS scoring will not consider the effects of responses that do not reduce waste quantities such as providing alternate drinking water supplies to populations with drinking water supplies contaminated by the site. In such cases, EPA believes that the initial targets factor should be used to reflect the adverse impacts caused by contamination of drinking water supplies; otherwise, a contaminated aquifer could be artificially shielded from further remediation. This decision is consistent with SARA section 118(a), which requires that EPA give high priority to sites where contamination from the site results in closed drinking water wells. Similarly, if residents are relocated or if a school is closed because of contamination due to the site, EPA will consider the initial targets in scoring the site.

As noted in the proposed rule preamble, EPA would only consider removals conducted prior to an SI. EPA believes that the SI is the appropriate time to evaluate conditions, because it is the source of most of the data used to score a site. Because response action at sites may be an ongoing process, it would be burdensome to recalculate scores continually to reflect such actions.

In response to commenters, EPA also considered whether response actions should be considered in HRS scores only if they are performed under a State or EPA order. EPA decided not to choose this approach for two reasons. First, it would diminish the incentive for an expeditious response at the site if a signed order were required. Second, because a response action must be conducted before the SI to be considered in the HRS score, there would be little information on site conditions upon which this order could be based.

EPA has also decided not to differentiate between response actions initiated by States and those conducted by other parties. The Agency believes this approach will help ensure consistent application of the HRS by avoiding situations where two similar sites are scored using different sets of rules. Moreover, although the Agency is sympathetic to concerns about disincentives to States for initiating actions, it believes that such cases will be rare. Many State (and Federal) removal actions are interim measures designed to stabilize conditions at the site. Given the more limited definition of response action noted above (e.g., removal of waste from the site for disposal or destruction in a RCRA-permitted facility), many actions conducted by States would not be considered in HRS scoring. In addition, in many cases, State and Federal removal actions are undertaken after an SI has been conducted. As noted above, EPA will only consider removals conducted before the SI in the HRS score.

R. Cutoff Score

In the NPRM preamble, EPA proposed that the cutoff score for the revised HRS be functionally equivalent to the current cutoff score of 28.5. The Agency also requested comment on three proposed options for determining functional equivalence:

- Option 1: Score sites using both the original and final rule, then use statistical analysis to determine what revised HRS score best corresponds to 28.5;
- Option 2: Choose a score that would result in an NPL of the same size as the NPL that would be created by using the original HRS; and
- Option 3: Identify the risk level that would correspond to 28.5 in the original HRS and then determine what revised HRS score corresponds to that risk level.

Some commenters stated that there cannot be a functional equivalence if the revisions have any meaning. They argued that if the revisions meet the statutory mandate to make the HRS more accurate, the scores should be different and, therefore, cannot be related. Several commenters supported the use of a functional equivalent, but were divided about which option should be used. One commenter stated that the 28.5 score should be evaluated to determine whether it reflected minimum risk levels. If it did, the commenter suggested that a functional equivalent would be appropriate and should be determined using equivalent risk levels (option 3), but also with an eye toward keeping the NPL to a manageable size (option 2).

Commenters not supporting the use of a functional equivalent suggested a variety of alternative approaches, including:

- Establish the cutoff score based on risk, without regard to the current cutoff level or a functional equivalent;
- Leave the score at 28.5;
- Propose a new cutoff score and a description of methodology in a public notice with a 60-day public comment period;
- Lower the cutoff score to provide an incentive to responsible parties to undertake remedial efforts and make it possible for sites where a removal action has taken place to make the NPL, thus reducing the controversy over whether to score sites based on current conditions;
- Raise the cutoff score by at least 20 points;
- Eliminate the present cutoff score by creating categories of sites instead of individual ranks as a means of prioritizing NPL sites;
- Amend the NPL annually to include only those sites that deserve priority attention (e.g., orphaned sites) and are likely to receive Superfund financing; or
- Rank all sites showing any degree of public health and/or environmental risk on a relative scale and perform remedial activities based on available funding.

In addition, four commenters felt that the cutoff score for the final rule should not be fixed until the technical merits and potential scores of representative sites are tested and compared using both the current and proposed HRS. Further, one commenter noted that the field test did not indicate the relationship between the revised HRS score for a given site and the current score; another added that until this equivalency issue is clarified, meaningful comment on any proposed revisions cannot be made.

Based on an analysis of 110 test sites, EPA has decided not to change the cutoff score at this time. This conclusion was reached after applying all three approaches to setting a cutoff score that would be functionally equivalent to 28.5. In its analysis, the Agency scored field test sites with both the original and revised HRS. The data from these test sites show that few sites score in the range of 25 to 30 with the revised HRS model. The Agency believes that this range may represent a breakpoint in the distribution of site scores and that the sites scoring above the range of 25–30 are clearly the types of sites that the Agency should capture with a screening model. Because the analysis did not point to a single number as the appropriate cutoff, the Agency has decided to continue to employ 28.5 as a management tool for identifying sites that are candidates for the National Priorities List.

EPA believes that the cutoff score has been, and should continue to be, a mechanism that allows it to make objective decisions on national priorities. Because the HRS is intended to be a screening system, the Agency has never attached significance to the cutoff score as an indicator of a specific level of risk from a site, nor has the Agency intended the cutoff to reflect a point below which no risk was present. The score of 28.5 is not meant to imply that risky and non-risky sites can be precisely distinguished. Nevertheless, the cutoff score has been a useful screening tool that has allowed the Agency to set priorities and to move forward with studying and, where appropriate, cleaning up hazardous waste sites. The vast majority of sites scoring above 28.5 in the past have been shown to present risks. EPA believes that a cutoff score of 28.5 will continue to serve this crucial function.

IV. Section-by-Section Analysis of Rule Changes

Besides the changes discussed above, EPA has made substantial editorial revisions in the rule being adopted today. Source characterization is discussed in section 2 of the final rule, along with factors that are evaluated in each pathway. These factors include hazardous waste quantity, toxicity, and evaluation of targets based on benchmarks. The order of presentation of the pathways has been changed to ground water, surface water, soil exposure, and air. Following the four sections describing the pathways, a section has been added explaining how to evaluate sites that have radionuclides either as the only hazardous substances at the site or in combination with other hazardous substances.

In general, descriptive text that provided background information has been removed as have references and data sources; the sections have been rewritten to make the rule easier to read and to apply. The figures presenting overviews of the pathways and the scoring sheets have been revised throughout to reflect changes in the rule and assigned values.

This section describes, for each section of the rule and each table, the specific substantive changes; editorial changes that do not affect the content of the rule are not generally noted.

Section 1 Introduction

The text explaining the background of the HRS and describing the rule has been removed. Definitions of a number of additional terms used in the rule have been added for clarity. The definition of "hazardous substance" has been revised for clarification. The definition of "site" has been clarified and now indicates that the area between sources may also be considered part of the site. The definition of "source" has been revised to explain that those volumes of air, ground water, surface water, or surface water sediments that become contaminated by migration of hazardous substances are not considered a source, except contaminated ground water plumes or contaminated surface water sediments may be considered a source if they cannot be attributed to an identified source. In addition, the definition of source now includes soils contaminated by migration of hazardous substances.

Under the original HRS, the Agency took the approach that all feasible efforts should be made to identify sources before listing a site on the NPL. If, after an appropriate effort has failed to identify a source, the Agency believed that the contamination was likely to have originated at the type of source that would be addressed under Superfund, such sites were listed. Subsequent investigations after listing have generally identified a specific source. In some cases, EPA has not listed contaminated media without clearly identified sources because it appeared the source of pollution would not be addressed by Superfund programs; an example of such a source would be extensive, low-level contamination of surface water sediments caused by pesticide applications. EPA has found this approach to be generally workable and will continue to evaluate, on a case-by-case basis, whether sites with no identified sources should be listed.

Where contaminated media with no identified sources exist, the final rule generally assigns a hazardous waste quantity factor value to such contamination, with the value depending on whether there are any targets subject to Level I or Level II concentrations. For contaminated sediments in the surface water migration pathway, if there is a clearly defined direction of flow, target distances are measured from the point of observed sediment contamination that is farthest upstream. For ground water plumes and for contaminated sediments where there is no clear direction of flow, the center of the observed ground water or sediment contamination is used for the purpose of measuring target distance limits.

Section 2 Evaluations Common to Multiple Pathways

This section covers factors and evaluations common to multiple pathways. The major changes to these factors include: observed release criteria have been revised; the toxicity factor has been changed to a linear rather than a log scale; scales for hazardous waste quantity have been made linear and expanded, and the hazardous waste quantity minimum value has been changed; the waste characteristics factor category score is now obtained by multiplying the factor values and using a table to assign the final score; use of benchmarks has been extended to all pathways and to the nearest individual (well/intake) factor; and the methods for comparisons to benchmarks have been changed as have the benchmarks used. The purpose of this part is to make the rule less repetitious by presenting full explanations of the evaluation of certain factors only once rather than in each pathway in which they occur.

Exceptions related to radionuclides are noted throughout the rule and referenced to Section 7.

Section 2.1 Overview. Introduces the pathways and threats included in HRS scoring.

Section 2.1.1 Calculation of HRS site score. Provides the equation used to calculate the final HRS score.

Section 2.1.2 Calculation of pathway score. Indicates, in general, how pathway scores are calculated and includes a sample pathway score sheet (Table 2–1).

Section 2.1.3 Common evaluations. Lists evaluations common to all pathways.

Section 2.2 Characterize sources. Introduces source characterization and references Table 2–2, the new sample-source characterization worksheet.

Section 2.2.1 Identify sources. Explains that for the three migration pathways, sources are identified, and for the soil exposure pathway, areas of observed contamination are identified.

Section 2.2.2 Identify hazardous substances associated with a source. Covers information previously provided in the introduction to the waste characteristics factor category.

Section 2.2.3 Identify hazardous substances available to a pathway. Explains which hazardous substances may be considered available to each pathway. For the three migration pathways, the primary limitation on availability of a hazardous substance to a pathway is that the substance must be in a source with a containment factor value, for that pathway, greater than 0; that is, the hazardous substance must be available to migrate from its source to the medium evaluated. For the soil exposure pathway, the primary limitation is that the substance must meet the criteria for observed contamination and, for the nearby threat, it must also be accessible.

Section 2.3 Likelihood of release. Specifies the criteria for establishing an observed release (discussed in section III G of this preamble) and explains that potential to release factors are evaluated only when an observed release cannot be documented. Table 2–3, which replaces Table 2–2 in the proposed rule, provides the revised observed release criteria for chemical analyses for the migration pathways. Table 2–3 is also used in establishing observed contamination for the soil exposure pathway.

Section 2.4 Waste characteristics. Defines the waste characteristics factor category.

Section 2.4.1 Selection of substance potentially posing greatest hazard. Explains how to select the substance potentially posing the greatest hazard.

Section 2.4.1.1 Toxicity factor. Explains how to assign toxicity values. Changes in the approach to scoring toxicity are discussed in section III D of this preamble. Table 2–4 (proposed rule Table 2–11) has been revised to make the assigned factor values linear rather than logarithmic values; however, the relationship among the values has not changed. A provision to always assign lead (and its compounds) an HRS toxicity factor value of 10,000 was added as a result of changes since the time of the proposed rule in the way EPA develops chronic toxicity values for lead (i.e., reference doses, in units of intake (mg/kg-day), are no longer developed for lead).

Section 2.4.1.2 Hazardous substance selection. Lists which factors are combined, in each pathway or threat, to select the hazardous substance potentially posing the greatest hazard. For each migration pathway, each substance eligible for consideration is evaluated based on the combination of toxicity (human or ecosystem) and/or mobility, persistence, and bioaccumulation (or ecosystem bioaccumulation) potential. The substances selected for each pathway or threat are those with the highest combined values. For the soil exposure pathway, the substance with the highest toxicity value is selected from among substances that meet the criteria for observed contamination for the threat being evaluated. The use of bioaccumulation in the selection of substances in the human food chain threat has changed as a result of the structural changes discussed above. In the proposed rule, only substances with the highest bioaccumulation values were evaluated for toxicity/persistence; in the final rule, the substance with the highest combined toxicity/persistence/bioaccumulation value is selected in the human food chain threat of the overland flow/flood migration component. For the ground water to surface water migration component, mobility is also considered. This revised method better reflects the overall threat.

Section 2.4.2 Hazardous waste quantity. Describes how to calculate the hazardous waste quantity factor value, as explained in section III D of this preamble. The explanation has been simplified from that presented in the proposed rule, and a discussion of unallocated sources has been added. A discussion clarifying the method for evaluating hazardous waste quantity in the soil exposure pathway was also added, and clarifying language on this point was inserted throughout the subsections of § 2.4.2. Table 2-13 from the proposed rule has been eliminated.

Section 2.4.2.1 Source hazardous waste quantity. Details the measures that may be considered in evaluating hazardous waste quantity for a source or area of observed contamination.

Section 2.4.2.1.1 Hazardous constituent quantity. Explains how to assign a value to the hazardous constituent quantity factor. An explanation of the treatment of RCRA hazardous wastes has been added to clarify the scoring of these wastes. Table 2-5, Hazardous Waste Quantity Evaluation Equations (proposed rule Table 2-14), has been revised in several ways. The constant divisor of 10 has been moved from these equations and is now incorporated into the factor values assigned using Table 2-6. Two types of surface impoundments are now listed to ensure that buried surface impoundments are treated appropriately. The term "tanks" has been added to containers other than drums to clarify how tanks should be evaluated. Also, equations for calculating hazardous waste quantity based on area have been revised based on a study of waste sites. The study indicated that new depth assumptions should be used for some sources; the land treatment equation was revised based on data from the same study about typical loading rates in land treatment operations.

Section 2.4.2.1.2 Hazardous wastestream quantity. Explains how to assign a value for hazardous wastestream quantity based on the mass of the wastestream. An explanation of the treatment of RCRA hazardous wastes has been added to clarify the scoring of these wastes.

Section 2.4.2.1.3 Volume. Explains how to assign a value for source volume.

Section 2.4.2.1.4 Area. Explains how to assign a value for source area.

Section 2.4.2.1.5 Calculation of source hazardous waste quantity value. Explains how to assign a value to source hazardous waste quantity.

Section 2.4.2.2 Calculation of hazardous waste quantity factor value. Explains how to assign a factor value to hazardous waste quantity using Table 2-6. The values in Table 2-6 include several changes. The cap applied to the factor value (i.e., the lowest hazardous waste quantity value required to assign the maximum factor value) has been increased to reflect more accurately the range of hazardous substance quantities found at waste sites. The cap is set based on the maximum quantity found at current NPL sites. Rather than being assigned a maximum of 100, as in the proposed rule, the assigned factor values range to 1,000,000. Each factor value less than the cap is assigned for quantities that range across two orders of magnitude. The two-order-of-magnitude ranges reflect the uncertainty in estimates of both quantity and concentration of the hazardous substances in sources and associated releases as well as uncertainty in identifying all sources and associated releases. Using the ranges also simplifies documentation requirements. Non-zero values below 1 are rounded to 1 to ensure that sites with small amounts of hazardous substances will receive a non-zero score for waste characteristics. When hazardous constituent quantity data are incomplete, the minimum hazardous waste quantity factor value is 10, except for: (1) Migration pathways that have any target subject to Level I or II concentrations; and (2) migration pathways where there has been a removal action and the hazardous waste quantity factor value would be 100 or greater without consideration of the removal action. In these cases, the minimum hazardous waste quantity factor value has been changed to 100 (see sections III C and III Q above for further discussion of the new minimum values).

Section 2.4.3 Waste characteristics factor category value. Explains how to assign a value to the waste characteristics factor category. As discussed above, the final waste characteristics factor value is capped at 100 (1,000 with bioaccumulation potential). Values are assigned by placing the product of the waste characteristics factors into ranges of one order of magnitude, to a cap of 10^8 (10^{12} if bioaccumulation potential is considered).

Section 2.4.3.1 Factor category value. Explains how to use Table 2-7 to assign a value to waste characteristics when bioaccumulation (or ecosystem bioaccumulation) potential is not considered.

Section 2.4.3.2 Factor category value, considering bioaccumulation potential. Explains how to use Table 2-7 to assign a value to waste characteristics when bioaccumulation (or ecosystem bioaccumulation) potential is considered.

Section 2.5 Targets. Explains how targets factors are evaluated. This approach generally involves three levels of evaluation (Level I, Level II, and Potential) and the use of media-specific concentration benchmarks, as discussed in section III H of this preamble. Level III has been dropped; use of benchmarks has been extended to all pathways and to factors that assign values to the nearest individual (well/intake). Also discusses assigning level based on direct observation and describes when tissue samples that do not establish actual contamination may be used in comparisons to benchmarks.

Section 2.5.1 Determination of level of actual contamination at a sampling location. Explains the approach used for evaluating the level of actual contamination at a sampling location; changes have been made to allow the level of actual contamination in the human food chain threat to be based on tissue samples from aquatic food chain organisms that cannot be used to establish an observed release.

Section 2.5.2 Comparison to benchmarks. Lists benchmarks and explains how to determine whether benchmarks have been equalled or exceeded (see section III H of this preamble); changes have been made to allow the level of actual contamination in the human food chain threat to be based on tissue samples from aquatic food chain organisms that cannot be used to establish an observed release.

Section 3 Ground Water Migration Pathway

The ground water migration pathway evaluates threats resulting from releases or potential releases of hazardous substances to aquifers. The major changes specific only to this pathway include replacement of the depth to aquifer/hydraulic conductivity and sorptive capacity factors with travel time and depth to aquifer factors; a revised approach for assigning mobility values; removal of the ground water use factors and their replacement by a resources factor; evaluation of the nearest well factor based on benchmarks; and revisions to scoring of sites having both karst and non-karst aquifers present.

Section 3.0 Ground Water Migration Pathway. Descriptive text has been removed. Figure 3-1 has been revised to reflect revisions to the factors evaluated, and Table 3-1 has been revised to reflect the new factor category values throughout.

Section 3.0.1 General considerations. The title has been changed.

Section 3.0.1.1 Ground water target distance limit. An explanation of the treatment of contaminated ground water plumes with no identified source has been added. For these plumes, measurement of the target distance limit begins at the center of the area of observed ground water contamination;

the center is determined based on available data.

Section 3.0.1.2 Aquifer boundaries. Descriptive text has been removed.

Section 3.0.1.2.1 Aquifer interconnections. Descriptive text has been removed as have examples of information useful for identifying aquifer interconnections.

Section 3.0.1.2.2 Aquifer discontinuities. Descriptive text has been removed.

Section 3.0.1.3 Karst aquifer. Descriptive text has been removed, and references to factors have been revised to reflect changes in factors. Text was added to clarify that karst aquifers underlying any portion of the sources at a site are given special consideration.

Section 3.1 Likelihood of release. Descriptive text has been removed.

Section 3.1.1 Observed release. Description of the criteria for establishing an observed release has been revised as discussed in Section III G of this preamble.

Section 3.1.2 Potential to release. Text has been revised to reflect changes in the factors evaluated and to clarify that karst aquifers underlying any portion of the sources at a site are given special consideration in evaluating depth to aquifer and travel time.

Section 3.1.2.1 Containment. Explanatory text has been removed and the ground water containment table is referenced. Only sources that meet the minimum size requirement (i.e., that have a source hazardous waste quantity value of 0.5 or higher) are used in assigning containment factor values. This requirement has been added to ensure that very small, uncontained sources do not unduly influence the score. For example, a site might have a large, but highly contained source and a very small, uncontained source; without a minimum size requirement, potential to release could be assigned the maximum value based on the very small source, which could overestimate the potential hazard posed by the site. If no source meets the minimum size requirement, the highest ground water containment factor value assigned to the sources at the site is used as the factor value. Table 3–2—Containment Factor Values for Ground Water Migration Pathway, has been simplified by combining repetitious items and has been moved from an attachment to the proposed rule into the body of the rule.

Section 3.1.2.2 Net precipitation. A new map has been added as Figure 3–2 to assign net precipitation factor values. The equation for calculating monthly potential evapotranspiration was clarified. Descriptive text has been removed.

Section 3.1.2.3 Depth to aquifer. As described in section III L of this preamble, the depth to aquifer factor has replaced the sorptive capacity factor and is no longer combined in a matrix with hydraulic conductivity for scoring. Table 3–5 is new and provides the factor values. The depth to aquifer factor reflects the geochemical retardation capacity of the subsurface materials, which generally increases as the depth increases. Depth to aquifer factor values are assigned to three depth ranges. Clarifying language was added related to karst aquifers.

Section 3.1.2.4 Travel time. As discussed in section III L of this preamble, this factor replaces the depth to aquifer/hydraulic conductivity factor and is based on the least conductive layer(s) rather than on the conductivities of all layers between the hazardous substances and the aquifer. Table 3–7 has been revised to reflect these changes. Table 3–8 from the proposed rule has been renumbered as Table 3–6. Text on how to obtain information to score this factor has been removed. Clarifying language was added related to karst aquifers.

Section 3.1.2.5 Calculation of potential to release factor value. Text has been revised to reflect new factor names.

Section 3.1.3 Calculation of likelihood of release factor category value. New maximum value of 550 based on observed release has been added.

Section 3.2 Waste characteristics. Descriptive text has been removed.

Section 3.2.1 Toxicity/mobility. Descriptive text has been removed.

Section 3.2.1.1 Toxicity. References § 2.4.1.1.

Section 3.2.1.2 Mobility. As discussed in sections III F and III P of this preamble, the method for assigning mobility values to hazardous substances has been revised. Table 3–8 has been revised. Mobility values are now linear rather than categorical place holders and are assigned in a matrix combining water solubility and distribution coefficients. Mobility values may now vary by aquifer for a specific hazardous substance. The maximum mobility value is no longer assigned based on observed release by direct observation. A factor value of 0 is no longer assigned for mobility, as had been the case under the proposed rule, where categorical place-holder values were used; because mobility is now multiplied by toxicity and hazardous waste quantity, assigning a 0 value would result in a pathway score of 0. This result could understate the risk posed by a site with a large volume of highly toxic hazardous substances with low mobility. Furthermore, given the uncertainties about estimates of mobility in ground water and their applicability in site-specific situations, EPA determined that a 0 value should not be assigned to the mobility factor under any conditions.

Section 3.2.1.3 Calculation of toxicity/mobility factor value. Text has been simplified. Table 3–9 (proposed rule Table 3–10), the matrix for assigning factor values, has been revised to reflect the linear nature of the assigned values. Values for a specific hazardous substance may now vary by aquifer.

Section 3.2.2 Hazardous waste quantity. References § 2.4.2.

Section 3.2.3 Calculation of waste characteristics factor category value. Text has been revised to indicate the multiplication of the factors, the new maximum value, and the table used to assign the factor category value.

Section 3.3 Targets. Text has been revised to reflect the new names for factors. Descriptive text has been removed. Table 3–10 (Table 3–12 in the proposed rule) has been modified to list the revised benchmarks in this pathway.

Section 3.3.1 Nearest well. Title has been changed from maximally exposed individual. Text has been added to explain how to evaluate nearest wells with documented contamination (at Level I and II) and those potentially contaminated. Text was added to assign Level II contamination to any drinking water well where an observed release was established by direct observation. This section also explains how to evaluate wells drawing from karst aquifers. Table 3–11 has been renamed and the factor values have been changed. See section III B of this preamble for a discussion of the changes to assigned values for this factor.

Section 3.3.2 Population. As discussed in section III H, population is evaluated using health-based benchmarks for drinking water. For populations potentially exposed, population ranges are used to evaluate the factor. This section explains whom to count for population. Populations served by wells whose water is blended with that from other drinking water sources are to be apportioned based on the well's relative contribution to the total blended system. The rule includes instructions on the type of data to use when determining relative contributions of wells and intakes. This change is intended to reflect more accurately the exposure to populations through blended systems. The rule also includes instructions on how to apportion population for systems with standby wells or standby surface water intakes.

Section 3.3.2.1 Level of contamination. Explains how to evaluate population based on concentrations of hazardous substances in samples. Text was added to assign Level II contamination to any drinking water wells where there is an observed release by direct observation.

Section 3.3.2.2 Level I concentrations. Explains how to evaluate populations exposed to Level I concentrations. The scoring cap was eliminated, and the multiplier (i.e., weight) is now 10.

Section 3.3.2.3 Level II concentrations. Explains how to evaluate populations exposed to Level II concentrations. The scoring cap was eliminated, and the multiplier (i.e., weight) is now 1.

Section 3.3.2.4 Potential contamination. Explains how to assign values to populations potentially exposed to contamination from the site. The formula for calculating population values has been modified to reflect both the revised method for evaluating karst aquifers (see below) and the use of distance-weighted population values from Table 3-12, which has been added to assign distance-weighted values for populations in each distance category. The values are determined for each distance category and are then added across distance categories, and the sum is divided by 10 to derive the factor value for potentially contaminated population. The assigned values in Table 3-12 were determined by statistical simulation to yield the same population value, on average, as the use of the formulas in the proposed rule. The use of range values has been adopted as part of the simplification discussed in section III A. The rounding rules have also changed. The method for evaluating karst aquifers has been simplified and is explained in this section. Table 3-14 in the proposed rule, which included dilution weighting factors for the general case and for two special cases, has been removed, and the two special karst cases are no longer evaluated. (The generally applicable dilution factors for karst have not changed and are all incorporated into the distance-weighted population values in Table 3-12.) The scoring cap was eliminated, and the multiplier (i.e., weight) is now 0.1.

Section 3.3.2.5 Calculation of population factor value. Has been revised to reflect the changes in the evaluation of actually contaminated wells. The rounding rule has also been changed, and the scoring cap was eliminated.

Section 3.3.3 Resources. Describes how points are assigned to resource uses of ground water. Points may be assigned if there are no drinking water wells within the target distance limit, but the water is usable for drinking water. This scoring allows for consideration of potential future uses of the aquifers. (See section III I of this preamble for a discussion of the relative weighting of these factors.)

Section 3.3.4 Wellhead protection area. Explains how to assign values to this factor. The maximum value is assigned when a source or an observed release lies partially or fully within a wellhead protection area applicable to the aquifer being evaluated, and this value has been changed from 50 to 20 to adjust for scale changes. A new criterion for scoring this factor has been added. If a wellhead protection area applicable to the aquifer being evaluated is within the target distance limit and neither of the other conditions is met, a value of five is assigned. This change allows the HRS to place a value on the resource.

Section 3.3.5 Calculation of targets factor category value. Has been revised to reflect changes in the factor names. The rounding rule has been changed, and the scoring cap was eliminated.

Section 3.4 Ground water migration score for an aquifer. Text has been revised to reflect the new divisor for normalizing pathway scores.

Section 3.5 Calculation of ground water migration pathway score. Text has been simplified.

In addition to the above noted changes, the sorptive capacity factor has been eliminated and replaced by the depth to aquifer factor, as have the tables used to assign values to this factor (Tables 3-6 and 3-7 in the proposed rule). The ground water use factors have also been eliminated as have the tables used to assign their values (Tables 3-15 and 3-16 in the proposed rule). Figures 3-2, 3-3, and 3-4 and Tables 3-4, 3-8, 3-9, 3-13 of the proposed rule have been removed.

Section 4 Surface Water Migration Pathway

The surface water migration pathway evaluates threats resulting from releases or potential releases of hazardous substances to surface water bodies. One major change to this pathway is the addition of a new component for scoring ground water discharge to surface water; either this component or the overland flow/flood migration component or both may be scored. For each component, three threats are evaluated: drinking water threat, human food chain threat, and environmental threat. Other major changes specific to this pathway include elimination of the recreational use threat; simplification of overland flow potential to release factors; modifications to the human food chain threat including addition of a food chain individual; modifications to the treatment of bioaccumulation potential and addition of a similar factor, ecosystem bioaccumulation potential, to the evaluation of the environmental threat; modifications to the persistence factor; revisions to the dilution weights; additions of benchmarks, extension of benchmarks to evaluation of the nearest intake, and addition of levels of contamination to the human food chain targets; modifications to criteria for establishing actual food chain contamination; elimination of the surface water use factor; addition of a resources factor to the targets evaluation in the drinking water threat; and revisions to sensitive environments.

Section 4.0 Surface Water Migration Pathway. New structure of the pathway is explained. Descriptive text has been removed. Figure 4-1 has been revised to reflect revisions to the factors evaluated, and Table 4-1 has been revised to reflect the new factor category values throughout.

Section 4.0.1 Migration components. Explains how to score the two migration components.

Section 4.0.2 Surface water categories. A definition of coastal tidal waters has been added. Some surface water bodies that belong in this new category were listed in other categories in the proposed rule (e.g., bays and wetlands contiguous with oceans). Isolated perennial wetlands have been added to the definition of lakes; salt water harbors largely protected by seawalls have been removed from the definition of lakes. Ocean has been defined more precisely as areas seaward from the baseline of the Territorial Sea. Contiguous bays have been removed from, and wetlands contiguous to the Great Lakes have been added to ocean and ocean-like bodies. These definitional changes/clarifications more accurately reflect the different characteristics of the water bodies.

Section 4.1 Overland flow/flood migration component. As discussed in section III M of this preamble, the surface water migration pathway has been divided into two components. The overland flow/flood component is essentially the surface water migration pathway as proposed except that the recreational use threat has been eliminated.

Section 4.1.1 General considerations. Consists of several subsections.

Section 4.1.1.1 Definition of the hazardous substance migration path for overland flow/flood migration component. Text has been simplified.

Section 4.1.1.2 Target distance limit. Explains target distance limits for sites in general and adds an explanation of how to calculate the target distance limit for contaminated sediments with no identified source. For these latter sources only, when there is a clearly defined direction of flow, the target distance limit is measured beginning at the observed sediment contamination farthest upstream; when there is no clearly defined direction of flow, the target distance limit is measured from the center of the area of observed sediment contamination. Discusses the determination of whether surface water targets are subject to actual or potential contamination. Also, text was added to assign Level II to targets subject to actual contamination based on direct observation.

Section 4.1.1.3 Evaluation of the overland flow/flood migration component. Explains that for multiple watersheds, highest score assigned to a watershed is used instead of summing watershed scores as proposed.

Section 4.1.2 Drinking water threat. Descriptive text has been removed.

Section 4.1.2.1 Drinking water threat—likelihood of release. Text has been simplified to clarify when potential to release factors need to be evaluated.

Section 4.1.2.1.1 Observed release. Text has been revised to reflect the changed maximum value.

Section 4.1.2.1.2 Potential to release. Text has been revised to reflect the changed maximum value and has been simplified.

Section 4.1.2.1.2.1 Potential to release by overland flow. Explains when overland flow potential to release is not evaluated.

Section 4.1.2.1.2.1.1 Containment. Text has been revised to reflect changes in the numbering of the containment table. Only sources that meet the minimum size requirement (i.e., that have a source hazardous waste quantity value of 0.5 or higher) are used in assigning containment values. This requirement has been added to ensure that very small, uncontained sources do not unduly influence the score. For example, a site might have a large, but highly contained source and a very small, uncontained source; without a minimum size requirement, the potential to release could be assigned the maximum value based on the very small source, which could overestimate the potential hazard posed by the site. If no source meets the minimum size requirement, the source with the highest surface water containment factor value is used. Descriptive text has been removed. Table 4–2, Containment Factor Values for Surface Water Migration Pathway, has been simplified by combining repetitious items and has been moved from an attachment to the proposed rule into this section of the final rule.

Section 4.1.2.1.2.1.2 Runoff. Text on evaluating rainfall has been simplified by removing explanatory references. The runoff curve number has been simplified by substituting a soil group designation in its place. Table 4–4 (proposed rule Table 4–2) has been revised to list only the soil group designations. Based on analyses of runoff and actual drainage area sizes, Table 4–3 (proposed rule Table 4–3) has been revised by changing the divisions of drainage area size. Table 4–5 (proposed rule Table 4–4) has been revised to reflect the changes related to the use of soil group designations. Table 4–6 (proposed rule Table 4–5) has been revised so that the heading in the table reads Rainfall/Runoff Value; the values assigned have been adjusted on the basis of both the higher maximum value assigned to the factor category and the analyses described above. Explanatory text has been removed.

Section 4.1.2.1.2.1.3 Distance to surface water. Values assigned to distance to surface water factor values in Table 4–7 (proposed rule Table 4–6) have been revised to adjust for the higher maximum assigned to the factor category.

Section 4.1.2.1.2.1.4 Calculation of the factor value for potential to release by overland flow. Has not been changed except for assigned value.

Section 4.1.2.1.2.2 Potential to release by flood. Descriptive text has been removed.

Section 4.1.2.1.2.2.1 Containment (flood). Text in Table 4–8 (proposed rule Table 4–7) has been revised to incorporate new language on required documentation on containment. The requirement for certification by an engineer has been dropped. The new documentation requirements have been added to make the rule consistent with RCRA requirements.

Section 4.1.2.1.2.2.2 Flood frequency. Values assigned to this factor by Table 4–9 (proposed rule Table 4–8) have been revised to better reflect probabilities and to adjust for the higher maximum assigned to the factor category. Descriptive text has been removed.

Section 4.1.2.1.2.2.3 Calculation of the factor value for potential to release by flood. Has been revised to reflect a minimum size requirement for sources.

Section 4.1.2.1.2.3 Calculation of potential to release factor value. Text has been simplified, and the assigned value has been changed.

Section 4.1.2.1.3 Calculation of drinking water threat—likelihood of release factor category value. Text has been simplified. The maximum value has been changed, and the maximum for potential to release is no longer equal to the maximum for observed release.

Section 4.1.2.2 Drinking water threat—waste characteristics. Descriptive text has been removed.

Section 4.1.2.2.1 Toxicity/persistence. Editorial changes have been made.

Section 4.1.2.2.1.1 Toxicity. References § 2.4.1.1.

Section 4.1.2.2.1.2 Persistence. As discussed in section III F of this preamble, several changes have been made to this factor, including the deletion of free-radical oxidation as a decay process and the inclusion of consideration of K_{ow} to account for sorption to sediments. Table 4–10 (proposed rule Table 4–9) has been revised to change the values assigned from categorical numbers to linear scales. The divisions among the half-lives for rivers, oceans, coastal tidal waters, and Great Lakes have changed based on a study of travel time, and the text has been modified to clarify the procedure for determining whether to base the persistence factor on lakes or on rivers, oceans, coastal tidal waters, and Great Lakes. A factor value of 0 is no longer assigned for persistence, as had been the case under the proposed rule, where categorical place-holder values were used; because persistence is now multiplied by toxicity and hazardous waste quantity, assigning a 0 value would result in a pathway score of 0. This result could understate the risk posed by a site with a large volume of highly toxic hazardous substances with low persistence. Furthermore, given the uncertainties about half-life estimates and their applicability in site-specific situations, EPA determined that a 0 value should not be assigned to the persistence factor under any conditions. The text has been modified to clarify selection of an appropriate default value. Table 4–11—Persistence Values—Log K_{ow}, has been added. Descriptive text has been removed.

Section 4.1.2.2.1.3 Calculation of toxicity/persistence factor value. Table reference has been changed to reflect the change in numbering. Table 4–12 (proposed rule Table 4–10) has been changed to reflect the multiplicative relationship.

Section 4.1.2.2.2 Hazardous waste quantity. References § 2.4.2.

Section 4.1.2.2.3 Calculation of drinking water threat—waste characteristics factor category value. Text has been revised to indicate the multiplication of the factors, the new maximum value, and the table used to assign the factor category value.

Section 4.1.2.3 Drinking water threat—targets. Descriptive text has been removed. Text was added to assign Level II to actual contamination based on direct observation.

Section 4.1.2.3.1 Nearest intake. Title and the factor name have been changed. As discussed in Section III B of this preamble, this factor is now assigned values based on health-based benchmarks. Instructions for how to assign dilution weights to closed lakes and lakes with no surface flow entering have been added. Table 4-13, Surface Water Dilution Weights (proposed rule Table 4-11), has been revised to add more types of surface water bodies and to change the dilution weights. These changes have been made to reflect more accurately the flow ranges of water bodies and are based on analysis of data on flow rates and dilution.

Section 4.1.2.3.2 Population. As explained above, population is evaluated based on two levels of actual contamination. Targets potentially contaminated are dilution weighted and are assigned values based on ranges. Populations served by intakes which are blended with water from other drinking water sources are to be apportioned based on the intake's relative contribution to the total blended system. The rule includes instructions on the type of data to use when determining relative contributions of intakes and wells. This change is intended to reflect more accurately the exposure of populations through blended systems. The rule also includes instructions on how to apportion population for systems with standby wells or standby surface water intakes.

Section 4.1.2.3.2.1 Level of contamination. Explains how to evaluate population based on the level of contamination to which they are exposed.

Section 4.1.2.3.2.2 Level I concentrations. Descriptive text has been removed. The scoring cap was eliminated, and the multiplier (i.e., weight) is now 10.

Section 4.1.2.3.2.3 Level II concentrations. Text has been simplified and revised to reflect the changes discussed above. The scoring cap was eliminated, and the multiplier (i.e., weight) is now 1.

Section 4.1.2.3.2.4 Potential contamination. Equation used to calculate this factor has been revised as discussed above. A new table, Table 4-14, Dilution-Weighted Population Values for Potential Contamination Factor for Surface Water Migration Pathway, has been added to assign values, which are then added across different surface water body types and divided by 10 to derive the value for potentially contaminated population. The assigned values in Table 4-14 for each population range category were determined by statistical simulation to yield the same population value, on average, as the use of the formulas in the proposed rule. The use of range values has been added as part of the simplification discussed in section III A. The rounding rule has also been changed, the scoring cap was eliminated, and the multiplier (i.e., weight) is now 0.1.

Section 4.1.2.3.2.5 Calculation of population factor value. Explains how to combine values assigned to the three population groups. The rounding rule has also been changed, and the scoring cap was eliminated.

Section 4.1.2.3.3 Resources. As discussed in section III J of this preamble, this factor has been added to account for the potential impact of surface water contamination on resource uses.

Section 4.1.2.3.4 Calculation of drinking water threat—targets factor category value. Has been revised to reflect the changes in this factor category. The rounding rule has also been changed, and the scoring cap was eliminated.

Section 4.1.2.4 Calculation of drinking water threat score for a watershed. Text has been simplified. The divisor has changed.

Section 4.1.3 Human food chain threat. Descriptive text has been removed.

Section 4.1.3.1 Human food chain threat—likelihood of release. Section references have been changed.

Section 4.1.3.2 Human food chain threat—waste characteristics. Text has been simplified.

Section 4.1.3.2.1 Toxicity/persistence/bioaccumulation. Text has been simplified and modified because of the change in the use of bioaccumulation potential in selecting the substance potentially posing the greatest hazard.

Section 4.1.3.2.1.1 Toxicity. Has been changed to reference § 2.4.1.1. Also changed so that evaluation of toxicity is not limited to substances with the highest bioaccumulation potential.

Section 4.1.3.2.1.2 Persistence. Clarifies how to evaluate persistence for contaminated sediment sources, and adds coastal tidal waters as a category of surface water. Also changed so that evaluation of persistence is not limited to substances with the highest bioaccumulation potential.

Section 4.1.3.2.1.3 Bioaccumulation potential. As described in section III M of this preamble, the method of accounting for bioaccumulation potential in the selection of the substance potentially posing the greatest hazard has been changed. In the final rule, bioaccumulation potential is considered together with toxicity and persistence rather than as a primary selection criterion. This change was made because all three factors are now scored on linear scales. In addition, where data exist, separate bioconcentration factor values are assigned for salt water and fresh water; the text now clarifies that the higher of these values is used for fisheries in brackish water and for sites with fisheries present in both salt water and fresh water. The adjustment for biomagnification has been dropped because it tended to double count bioaccumulation. Both Table 4-15 (Table 4-14 in the proposed rule) and the text have been modified to clarify the data hierarchy for assigning bioaccumulation potential factor values. Also, Table 4-15 now makes it clear that the assigned values for bioaccumulation potential are on a linear scale.

Section 4.1.3.2.1.4 Calculation of toxicity/persistence/bioaccumulation factor value. Explains how to calculate a toxicity/persistence/bioaccumulation value. Table 4-16, Toxicity/Persistence/Bioaccumulation, has been added to assign the factor value.

Section 4.1.3.2.2 Hazardous waste quantity. References § 4.1.2.2.2.

Section 4.1.3.2.3 Calculation of human food chain threat—waste characteristics factor category value. Text has been revised to indicate the multiplication of the toxicity/persistence and hazardous waste quantity factor values, subject to a maximum, and the further multiplication of that product by the bioaccumulation potential factor value, subject to a maximum for this second product, and to reference the table for assigning the factor category value.

Section 4.1.3.3 Human food chain threat—targets. Has been revised to reflect addition of the new food chain individual and the deletion of the fishery use factor. As discussed in section III M of this preamble, criteria for establishing a fishery subject to actual contamination have been revised. Text was added to describe the additional tissue samples that can be used to establish Level I contamination.

Section 4.1.3.3.1 Food chain individual. As discussed in section III M of this preamble, this factor is new. This section explains how to assign a value to the factor.

Section 4.1.3.3.2 Population. Has been changed as discussed in section III M of this preamble.

Section 4.1.3.3.2.1 Level I concentrations. The approach to calculating this factor value has been revised as discussed in section III M of this preamble. The rounding rule has been changed, the scoring cap was eliminated, and the multiplier (i.e., weight) is now 10.

Section 4.1.3.3.2.2 Level II concentrations. Explains how to assign values as discussed in section III M of this preamble. The rounding rule has been changed, the scoring cap was eliminated, and the multiplier (i.e., weight) is now 1.

Section 4.1.3.3.2.3 Potential human food chain contamination. The approach to calculating this factor value has been revised as discussed in section III M of this preamble. The rounding rule has been changed, the scoring cap was eliminated, and the multiplier (i.e., weight) is now 0.1.

Section 4.1.3.3.2.4 Calculation of the population factor value. Text has been revised to omit the maximum. The rounding rule has been changed, and the scoring cap was eliminated.

Section 4.1.3.3.3 Calculation of human food chain threat—targets factor category value. Explains how to calculate the targets value. The rounding rule has been changed, and the scoring cap was eliminated.

Section 4.1.3.4 Calculation of human food chain threat score for a watershed. Text has been simplified. The divisor has changed.

Section 4.1.4 Environmental threat. Descriptive text has been removed.

Section 4.1.4.1 Environmental threat—likelihood of release. Section references have been changed.

Section 4.1.4.2 Environmental threat—waste characteristics. Descriptive text has been removed.

Section 4.1.4.2.1 Ecosystem toxicity/persistence/bioaccumulation. Text has been revised to include the addition of ecosystem bioaccumulation potential as a multiplicative factor.

Section 4.1.4.2.1.1 Ecosystem toxicity. The approach for evaluating ecosystem toxicity has been revised. Additions have been made to the data hierarchy (see section III J of this preamble), and a default value of 100 was added to cover the situation where appropriate aquatic toxicity data were unavailable for all of the substances being evaluated. Table 4-19 (proposed rule Table 4-23) has been revised to make the factor linear and to eliminate the rating category of 0 (except when data are unavailable for a given substance); these changes make the ecosystem toxicity factor more consistent with the toxicity factor in the other pathways and threats. Text was added to clarify the evaluation of ecosystem toxicity for brackish water.

Section 4.1.4.2.1.2 Persistence. Section references have been changed. Clarifies how to evaluate persistence for contaminated sediment sources, and adds coastal tidal waters as a category of surface water.

Section 4.1.4.2.1.3 Ecosystem bioaccumulation potential. As explained in section III J of this preamble, this factor is new for this threat and is evaluated similarly to (but with several key differences from) the bioaccumulation potential factor in the human food chain threat.

Section 4.1.4.2.1.4 Calculation of ecosystem toxicity/persistence/bioaccumulation factor value. Section references have been changed. Table 4-20 (proposed rule Table 4-24) has been changed to reflect the changes in the values for the factors. Table 4-21, Ecosystem Toxicity/Persistence/Bioaccumulation Values, is new and assigns values for the combined toxicity/persistence/bioaccumulation factor.

Section 4.1.4.2.2 Hazardous waste quantity. Section references have been changed.

Section 4.1.4.2.3 Calculation of environmental threat—waste characteristics factor category value. Text has been revised to indicate the multiplication of the ecosystem toxicity/persistence and hazardous waste quantity factor values, subject to a maximum, and the further multiplication of that product by the ecosystem bioaccumulation potential factor value, subject to a maximum for this second product, and to reference the table for assigning the factor category value.

Section 4.1.4.3 Environmental threat—targets. Descriptive text has been removed.

Section 4.1.4.3.1 Sensitive environments. Explains how to evaluate sensitive environments. Table 4-22, Ecological-Based Benchmarks for Hazardous Substances in Surface Water, has been revised as described in section III H of this preamble. The rounding rule has also been changed.

Section 4.1.4.3.1.1 Level I concentrations. Explains the new method of evaluating wetlands based on wetland frontage, or, in some situations, wetland perimeter. Table 4-23, Sensitive Environments Rating Values, has been revised as discussed in section III J of this preamble. Table 4-24, Wetlands Rating Values for Surface Water Migration Pathway, has been added to assign values to wetlands based on the total length of wetlands. The scoring cap was eliminated, and the multiplier (i.e., weight) is now 10.

Section 4.1.4.3.1.2 Level II concentrations. Has been revised to reflect the method of evaluating wetlands. The scoring cap was eliminated, and the multiplier (i.e., weight) is now 1.

Section 4.1.4.3.1.3 Potential contamination. Has been revised to reflect the method of evaluating wetlands. The rounding rule has also been changed, the scoring cap was eliminated, and the multiplier (i.e., weight) is now 0.1.

Section 4.1.4.3.1.4 Calculation of environmental threat—targets factor category value. Has been revised to remove the maximum from the targets factor category. The rounding rule has also been changed.

Section 4.1.4.4 Calculation of environmental threat score for a watershed. Divisor for the threat has changed. A cap of 60 was explicitly placed on the environmental threat score, which results in the same maximum possible threat score as in the proposed rule. (In the proposed rule, environmental threat targets were capped at 120, which resulted in an environmental threat score maximum of 60.) However, in the final rule the targets category is uncapped and can score higher than 120 to compensate for low scores in other factor categories.

Section 4.1.5 Calculation of overland flow/flood migration component score for a watershed. Explains how to calculate the score for the watershed.

Section 4.1.6 Calculation of overland flow/flood migration component score. Explains how to calculate the score for the component based on the highest watershed score (in the proposed rule watershed scores were summed).

Section 4.2 Ground water to surface water migration component. As discussed in section III M of this preamble, this component has been added to the rule to account for contamination of surface water bodies through ground water migration of hazardous substances. Thus, all sections referring to this component are new.

Section 4.2.1 General considerations.

Section 4.2.1.1 Eligible surface waters. Explains the conditions that must apply before this component is scored. In general, this component is scored only when there is a surface water within one mile of a source, the top of the uppermost aquifer is at or above the bottom of the surface water, and no aquifer discontinuity is established between the source and the portion of surface water within one mile of the source. Exceptions are also explained.

Section 4.2.1.2 Definition of the hazardous substance migration path for ground water to surface water migration component. Explains that the migration path is defined as shortest straight-line distance, within the aquifer boundary, from a source to surface water.

Section 4.2.1.3 Observed release of a specific hazardous substance to surface water in-water segment. Explains that before an observed release of an individual hazardous substance can be established to the surface water in-water segment, the substance must meet the criteria for an observed release both to ground water and to surface water (this requirement does not affect the actual scoring of observed release). Also clarifies the use of samples from the surface water in-water segment.

Section 4.2.1.4 Target distance limit. Explains the criteria for determining the target distance limit and for establishing whether targets are subject to actual or potential contamination.

Section 4.2.1.5 Evaluation of the ground water to surface water migration component. Explains the general approach for evaluating this component. Figure 4–2, Overview of Ground Water to Surface Water Migration Component, is new. Table 4–25, which is new, provides the scoring sheets for this component.

Section 4.2.2 Drinking water threat. Explains the general approach for evaluating this threat.

Section 4.2.2.1 Drinking water threat—likelihood of release. Explains the general approach for evaluating this factor category.

Section 4.2.2.1.1 Observed release. Explains that scoring an observed release is based on releases to ground water.

Section 4.2.2.1.2 Potential to release. Explains that scoring is based on the scoring of potential release to uppermost aquifer.

Section 4.2.2.1.3 Calculation of drinking water threat—likelihood of release factor category value. Explains how to assign the factor category value.

Section 4.2.2.2 Drinking water threat—waste characteristics. Explains the general approach for evaluating this factor category.

Section 4.2.2.2.1 Toxicity/mobility/persistence. Explains the approach for evaluating these factors.

Section 4.2.2.2.1.1 Toxicity. Explains that toxicity values are assigned to all hazardous substances available to migrate to ground water.

Section 4.2.2.2.1.2 Mobility. Explains that the mobility value is assigned to all hazardous substances available to migrate to ground water.

Section 4.2.2.2.1.3 Persistence. Explains that this factor value is assigned as in the drinking water threat for the overland flow/flood migration component for all hazardous substances available to migrate to ground water.

Section 4.2.2.2.1.4 Calculation of toxicity/mobility/persistence factor value. Explains that the factor value is the highest value assigned to any hazardous substance evaluated using Table 4–26, which is new.

Section 4.2.2.2.2 Hazardous waste quantity. Explains that hazardous waste quantity is calculated for hazardous substances available to migrate to ground water.

Section 4.2.2.2.3 Calculation of drinking water threat—waste characteristics factor category value. Explains how to calculate the factor category value.

Section 4.2.2.3 Drinking water threat—targets. Explains the general approach for evaluating this factor category.

Section 4.2.2.3.1 Nearest intake. Explains how to determine the dilution weight adjustment using Table 4–27, which was added, and how to assign factor values. Figure 4–3 was added to illustrate determination of the ground water to surface water angle. (See section III O of this preamble for a discussion of this adjustment.)

Section 4.2.2.3.2 Population. This section parallels other population factor sections.

Section 4.2.2.3.2.1 Level I concentrations. Parallels the population factor sections in the overland flow/flood migration component.

Section 4.2.2.3.2.2 Level II concentrations. Parallels the population factor sections in the overland flow/flood migration component.

Section 4.2.2.3.2.3 Potential contamination. Parallels the population factor sections in the overland flow/flood migration component, except for addition of the dilution weight adjustment.

Section 4.2.2.3.2.4 Calculation of population factor value. Parallels other population factor sections.

Section 4.2.2.3.3 Resources. Parallels other resources factor sections.

Section 4.2.2.3.4 Calculation of the drinking water threat—targets factor category value. Explains how to calculate the factor category value.

Section 4.2.2.4 Calculation of drinking water threat score for a watershed. Explains how to calculate the score for a watershed.

Section 4.2.3 Human food chain threat. Lists the factors evaluated.

Section 4.2.3.1 Human food chain threat—likelihood of release. Explains how to assign the factor category value.

Section 4.2.3.2 Human food chain threat—waste characteristics. Lists the factors evaluated.

Section 4.2.3.2.1 Toxicity/mobility/persistence/bioaccumulation. Explains how to calculate these factor values using Table 4–28, which is new.

Section 4.2.3.2.1.1 Toxicity. Explains how to calculate this factor value.

Section 4.2.3.2.1.2 Mobility. Explains how to calculate this factor value.

Section 4.2.3.2.1.3 Persistence. Explains how to calculate this factor value.

Section 4.2.3.2.1.4 Bioaccumulation potential. Explains how to calculate this factor value.

Section 4.2.3.2.1.5 Calculation of toxicity/mobility/persistence/bioaccumulation factor value. Explains how to calculate this value using Tables 3–9, 4–26, and 4–28.

Section 4.2.3.2.2 Hazardous waste quantity. Explains how to assign the factor value.

Section 4.2.3.2.3 Calculation of human food chain threat—waste characteristics factor category value. Explains how to calculate this factor category value.

Section 4.2.3.3 Human food chain threat—targets. Explains the factors to be evaluated.

Section 4.2.3.3.1 Food chain individual. Explains how to assign the factor value.

Section 4.2.3.3.2 Population. Explains how to calculate this factor value.

Section 4.2.3.3.2.1 Level I concentrations. Parallels the population factor in the human food chain threat for the overland flow/flood migration component.

Section 4.2.3.3.2.2 Level II concentrations. Parallels the population factor in the human food chain threat for the overland flow/flood migration component.

Section 4.2.3.3.2.3 Potential human food chain contamination. Parallels the population factor in the human food chain threat for the overland flow/flood component, except for addition of the dilution weight adjustment.

Section 4.2.3.3.2.4 Calculation of the population factor value. Explains how to calculate this factor value.

Section 4.2.3.3.3 Calculation of human food chain threat—targets factor category value. Explains how to calculate this factor category value.

Section 4.2.3.4 Calculation of human food chain threat score for a watershed. Explains how to calculate the score for a watershed.

Section 4.2.4 Environmental threat. Lists the factors evaluated.

Section 4.2.4.1 Environmental threat—likelihood of release. Explains how to calculate this factor category value.

Section 4.2.4.2 Environmental threat—waste characteristics. Explains how to calculate this factor category value.

Section 4.2.4.2.1 Ecosystem toxicity/mobility/persistence/bioaccumulation. Explains how to calculate these factor values.

Section 4.2.4.2.1.1 Ecosystem toxicity. Explains how to calculate this factor value.

Section 4.2.4.2.1.2 Mobility. Explains how to calculate this factor value.

Section 4.2.4.2.1.3 Persistence. Explains how to calculate this factor value.

Section 4.2.4.2.1.4 Ecosystem bioaccumulation potential. Parallels the ecosystem bioaccumulation evaluation in the overland flow/flood component, except expands the species considered as discussed in section III J.

Section 4.2.4.2.1.5 Calculation of ecosystem toxicity/mobility/persistence/bioaccumulation factor value. Explains how to calculate this factor value using Tables 3-9, 4-29, and 4-30, which were added.

Section 4.2.4.2.2 Hazardous waste quantity. Explains how to calculate this factor value.

Section 4.2.4.2.3 Calculation of environmental threat—waste characteristics factor category value. Explains how to calculate this factor category value.

Section 4.2.4.3 Environmental threat—targets. Explains how to calculate this factor category value.

Section 4.2.4.3.1 Sensitive environments. Explains how to calculate this factor value.

Section 4.2.4.3.1.1 Level I concentrations. Parallels factor sections in the overland flow/flood migration component.

Section 4.2.4.3.1.2 Level II concentrations. Parallels factor sections in the overland flow/flood migration component.

Section 4.2.4.3.1.3 Potential contamination. Parallels factor sections in the overland flow/flood migration component, except for addition of the dilution weight adjustment.

Section 4.2.4.3.1.4 Calculation of environmental threat—targets factor category value. Explains how to calculate the value for the factor category.

Section 4.2.4.4 Calculation of environmental threat score for a watershed. Explains how to calculate this threat score for a watershed.

Section 4.2.5 Calculation of ground water to surface water migration component score for a watershed. Explains how to calculate a watershed score for this component.

Section 4.2.6 Calculation of ground water to surface water migration component score. Explains how to calculate this score based on the scores for watersheds evaluated for this component.

Section 4.3 Calculation of surface water migration pathway score. Explains how to assign the pathway score.

In addition to the above noted changes, the recreational use threat has been eliminated. The drinking water use and other use factors have also been eliminated as have the tables (4-12 and 4-13 in the proposed rule) that related to scoring these factors. Figures 4-1, 4-2, and 4-3 as well as Tables 4-15, and 4-17 through 4-22 from the proposed rule have been eliminated.

Section 5 Soil Exposure Pathway

The soil exposure pathway evaluates threats resulting from contamination of surface material. The major changes specific to this pathway include revision of the name of the pathway; elimination of children under seven as a population that must be counted and evaluated separately; addition of hazardous waste quantity to the waste characteristics factor category; inclusion of workers in the evaluation of resident population targets; weighting of resident population based on benchmarks; inclusion of the nearest individual factor in both the resident and nearby targets factor category; inclusion of a resources factor in the resident population evaluation; and revisions to the sensitive environments factor.

Section 5.0 Soil Exposure Pathway. The name of the pathway has been changed from onsite exposure to soil exposure. Descriptive text has been removed. Figure 5-1 has been revised to reflect revisions to the factors evaluated. Table 5-1 has been revised to reflect the new factor category values throughout, which were made more consistent with the other pathways.

Section 5.0.1 General considerations. Has been revised to reflect the redefinition of source, discussed in section III N of this preamble. The methods for establishing areas of observed contamination and for determining the hazardous substances associated with an area of observed contamination have been clarified. The instructions have been revised to make clear that any part of a site that is covered by a permanent or otherwise maintained impermeable material such as asphalt is not considered in evaluating the pathway.

Section 5.1 Resident population threat. Has been revised to specify when the resident population threat should be evaluated. The requirements state that this threat is scored when there is an area of observed contamination within the property boundary and within 200 feet of a residence, school, day care center, or workplace, or within the boundaries of terrestrial sensitive environments and specified resources.

Section 5.1.1 Likelihood of exposure. Text has been simplified.

Section 5.1.2 Waste characteristics. Evaluation of waste characteristics has been changed to include hazardous waste quantity as well as toxicity. Hazardous waste quantity was added to the factor category in response to comments that the pathway did not consider the dose relationship; the combination of hazardous waste quantity and toxicity is a surrogate for that relationship and makes the pathway more consistent with the rest of the rule. The text has been revised to reflect the change.

Section 5.1.2.1 Toxicity. References the section explaining how to assign toxicity factor values.

Section 5.1.2.2 Hazardous waste quantity. This section is new and explains how to assign a value to this factor. Table 5-2, Hazardous Waste Quantity Evaluation Equations for Soil Exposure Pathway, is a revision of Table 2-14 from the proposed rule. This table differs from Table 2-5 of the final rule because generally only the top two feet of an area of observed contamination are considered in evaluating the pathway. Landfills, contaminated soils, waste piles, land treatment areas, dry surface impoundments, and buried/backfilled surface impoundments, which can be evaluated based on their volume in Table 2-5, are evaluated for this pathway using the area measure because the area measure now has a two-foot depth built into the equation. Surface impoundments containing hazardous substances present as liquids, tanks, and containers may be evaluated based on volume because it is possible that a person could wade, swim, reach, or fall to a depth greater than two feet.

Section 5.1.2.3 Calculation of waste characteristics factor category value. Explains how to combine the toxicity and hazardous waste quantity factor values, subject to the new maximum.

Section 5.1.3 Targets. This factor category has been revised substantially. As discussed in section III N above, the high-risk target population has been eliminated, and workers have been added as targets. Table 5-3, Health-Based Benchmarks for Hazardous Substances in Soils, has been added to list benchmarks appropriate for this pathway.

Section 5.1.3.1 Resident individual. The resident individual factor has been added for consistency with other pathways.

Section 5.1.3.2 Resident population. Explains how to evaluate the resident population using health-based benchmarks, described in section III H above, and how to estimate this population.

Section 5.1.3.2.1 Level I concentrations. Explains how to assign a value for this new factor.

Section 5.1.3.2.2 Level II concentrations. Explains how to assign a value for this new factor.

Section 5.1.3.2.3 Calculation of resident population factor value. Explains how to calculate this factor value.

Section 5.1.3.3 Workers. Explains how to evaluate workers.

Section 5.1.3.4 Resources. Explains how to assign values if the area of observed contamination includes land used for commercial agriculture, commercial silviculture, or commercial livestock grazing or production.

Section 5.1.3.5 Terrestrial sensitive environments. The value assigned for this factor has been revised so that the value is based on the sum of the values assigned to terrestrial sensitive environments in areas of observed contamination, rather than on the highest scoring terrestrial sensitive environment. The maximum value that can be assigned to this factor is limited, but is higher than under the proposed rule. The limit is determined by scoring the pathway with only sensitive environments in the targets factor category; the pathway score under these conditions may not exceed 60 points. The sensitive environments listed in Table 5-5 have been modified. The text has been simplified and references changed to correspond to changes in the rule. The rounding rule has been changed.

Section 5.1.3.6 Calculation of resident population targets factor category value. Explains how to calculate the factor category value from the revised factors. The rounding rule has been changed.

Section 5.1.4 Calculation of resident population threat score. Has only minor editorial changes.

Section 5.2 Nearby population threat. Introductory text has been clarified.

Section 5.2.1 Likelihood of exposure. Lists the factors evaluated.

Section 5.2.1.1 Attractiveness/accessibility. As explained in section III N of this preamble, the name of this factor has changed as have the criteria used to assign values. This factor now emphasizes the use of the area by the general public. Descriptive text has been removed. Table 5-6 (proposed rule Table 5-4) has been changed by redefining the criteria and the assigned values, and by adding a value of 0 for sites that are physically inaccessible to the public.

Section 5.2.1.2 Area of contamination. The title of this section has been changed. This factor is now based solely on area of contamination, which relates to the likelihood of exposure, unlike hazardous waste quantity, which serves as part of the surrogate for dose. Values are assigned using Table 5-7, which is new.

Section 5.2.1.3 Likelihood of exposure factor category value. Text has been revised to reflect the new names of the factors. Table 5-8 (proposed rule Table 5-5) has been revised in response to the changes noted above for the attractiveness/accessibility and area of contamination factors.

Section 5.2.2 Waste characteristics. Text has been revised to reflect changes in the factor category.

Section 5.2.2.1 Toxicity. Explains how to evaluate the toxicity factor for the nearby population threat.

Section 5.2.2.2 Hazardous waste quantity. This section is new, as is consideration of this factor in this threat. As discussed above, this factor has been added in response to comments and to make the pathway more consistent with the other pathways. The section explains how to assign the factor value.

Section 5.2.2.3 Calculation of waste characteristics factor category value. Explains how to combine the toxicity and hazardous waste quantity factor values, subject to the new maximum.

Section 5.2.3 Targets. Descriptive text has been removed.

Section 5.2.3.1 Nearby individual. This section is new and explains how to assign a value to the nearby individual (i.e., resident or student with shortest travel distance) if there is no resident individual. The factor has been added to make the nearby threat consistent with other pathways. Table 5-9, Nearby Individual Factor Values, is new.

Section 5.2.3.2 Population within one mile. This section is new and includes the text that previously appeared under the Targets section. The section explains how to assign a value using Table 5-10. The text has been revised for clarity. Table 5-10, Distance-Weighted Population Values for Nearby Population Threat, is new. The table assigns distance-weighted values for population in each travel distance category. The values in the table were determined by statistical simulation to yield the same population, on average, as the use of the formulas in the proposed rule. The distance weights have been modified as follows: for travel distance of >0 to ¼ mile, the assigned distance weight is 0.025; for >¼ to ½ mile, 0.0125, and for >½ to 1 mile, 0.00625. The use of population ranges has been adopted as part of the simplification discussed in section III A.

Section 5.2.3.3 Calculation of nearby population targets factor category value. Text has been revised to reflect the changes in the targets factor category and in the rounding rule.

Section 5.2.4 Calculation of nearby population threat score. Minor editorial changes only.

Section 5.3 Calculation of the soil exposure pathway score. Has been changed to reflect the change in the value used as a divisor.

In addition to the above noted changes, Figures 5-2 and 5-3 and Tables 5-4 and 5-6 from the proposed rule have been removed.

Section 6 Air Migration Pathway

The air migration pathway evaluates the relative threat resulting from releases or potential releases of hazardous substances, either as gases or particulates, to the air. The major changes specific to this pathway include separate evaluation of gas and particulates in the likelihood to release factor category; inclusion of benchmarks to evaluate population and the nearest individual; weighting of sensitive environments based on actual or potential contamination; revision of the distance weights; deletion of the land use factor and inclusion of a resources factor in the evaluation of population; and revisions to the mobility factor.

Section 6.0 Air Migration Pathway. Descriptive text has been removed. Figure 6-1 has been revised to reflect revisions to the factors evaluated, and Table 6-1 has been revised to reflect the new factor category values throughout.

Section 6.1 Likelihood of release. Has been revised to eliminate explanatory text and to add instructions about which factors to evaluate for this factor category.

Section 6.1.1 Observed release. As discussed in section III G of this preamble, the specific criteria have been revised.

Section 6.1.2 Potential to release. As explained in section III O of this preamble, the method for evaluating this factor has been revised. Gas potential to release and particulate potential to release are evaluated separately. The explanatory text has been removed.

Section 6.1.2.1 Gas potential to release. Explains how this factor is evaluated. Table 6-2 (proposed rule Table 2-8) has been revised to apply only to the gas potential to release factors.

Section 6.1.2.1.1 Gas containment. Descriptive text has been removed. Table 6-3 (proposed rule Table 2-5) has been simplified. The depth requirements and other containment requirements have been revised based on public comment, the field test, and a review of recent information on covering systems. Consideration of biogas releases has been added. Assigned values have been revised and also reflect the revised maximum value for the factor.

Section 6.1.2.1.2 Gas source type. New source types have been added to Table 6-4 (proposed rule Table 2-6), and the assigned values have been revised. As explained in section III O of this preamble, new source types and subgroups for specific types have been added, in response to comments and the field test, to make this factor easier to evaluate. Treatment of sources when no source meets the minimum size has been clarified.

Section 6.1.2.1.3 Gas migration potential. As explained in section III O of this preamble, this section has been renamed and the approach for assigning values changed slightly. This section explains how to assign values to each substance and subsequently to the source using Tables 6-5, 6-6, and 6-7. Dry soil relative volatility has been removed as a measure of gas migration potential. The footnotes have been removed from Table 6-5 (proposed rule Table 2-7) and the name has been changed to "Values for Vapor Pressure and Henry's Constant." The titles of Tables 6-6 and 6-7 have been changed. The values assigned have also been changed to reflect the revised maximum value for the factor category. Descriptive text has been removed.

Section 6.1.2.1.4 Calculation of gas potential to release value. Explains how to calculate this value.

Section 6.1.2.2 Particulate potential to release. Explains how this factor is evaluated. Table 6-8 (proposed rule Table 2-3) has been revised to apply only to the particulate potential to release factors.

Section 6.1.2.2.1 Particulate containment. References Table 6-9 (Table 2-5 from the proposed rule). The criteria and values assigned using this table have been changed, as discussed in section III O of this preamble. Considerations of depth have been added for particulates.

Section 6.1.2.2.2 Particulate source type. In response to comments, new kinds of source types and subgroups of source types have been added to make this factor easier to score. The values assigned have been revised to reflect the changed factor category maximum. Treatment of sources when no source meets the minimum size has been clarified.

Section 6.1.2.2.3 Particulate migration potential. Has been renamed. Descriptive text has been removed. Proposed rule Figure 2-3 has been simplified, expanded, and renumbered as Figure 6-2. Proposed rule Table 2-8 has been renumbered as Table 6-10.

Section 6.1.2.2.4 Calculation of particulate potential to release value. Describes how to calculate this value.

Section 6.1.2.3 Calculation of potential to release factor value for the site. Text has been simplified and modified to account for gas and particulate potential to release.

Section 6.1.3 Calculation of likelihood of release factor category value. Describes calculation procedure.

Section 6.2 Waste characteristics. Descriptive text has been removed.

Section 6.2.1 Toxicity/mobility. Text has been simplified.

Section 6.2.1.1 Toxicity. Descriptive text has been removed and § 2.4.1.1 is referenced.

Section 6.2.1.2 Mobility. As explained in section III F of this preamble, the scoring of this factor has changed. Gas mobility is now based only on vapor pressure. The maximum value assigned for particulate mobility is no longer the same as the maximum assigned for gas mobility. The particulate mobility values are assigned based on Figure 6-3 or the equation in the text along with Table 6-12. The values assigned have been put on linear scales to be consistent with the new structure of the waste characteristics factor category. The text has been simplified.

Section 6.2.1.3 Calculation of toxicity/mobility factor value. Table 6-13, proposed rule Table 2-12, the matrix for assigning toxicity/mobility factor values has been revised to reflect the changes in values assigned to both factors.

Section 6.2.2 Hazardous waste quantity. Descriptive text has been removed and § 2.4.2 is referenced.

Section 6.2.3 Calculation of waste characteristics factor category value. The text has been revised to indicate the multiplication of the component factors, the new maximum value, and the table used to assign the factor category value.

Section 6.3 Targets. The target distance limit has been modified to include targets beyond four miles when an observed release extends beyond that distance. Text has been added to explain how to evaluate populations and sensitive environments exposed to actual contamination. Text was added to clarify that actual contamination based on an observed release established by direct observation should be considered Level II. Table 6-14, Health-Based Benchmarks for Hazardous Substances in Air, has been added to list the benchmarks used for this pathway. Table 6-15, Air Migration Pathway Distance Weights (proposed rule Table 2-16), has been revised to reflect changes in the distance weights discussed in section III O of this preamble.

Section 6.3.1 Nearest individual. The title has been changed from maximally exposed individual. As discussed above, this factor is now evaluated based on actual contamination and potential contamination. The name of Table 6-16 (proposed rule Table 2-15) has been changed and the values have been revised based on changes to the distance weights. Descriptive text has been removed.

Section 6.3.2 Population. Evaluation of population based on health-based benchmarks has been added as discussed in section III H of this preamble.

Section 6.3.2.1 Level of contamination. Explains how to evaluate population based on concentrations of hazardous substances in samples.

Section 6.3.2.2 Level I concentrations. Explains how to evaluate populations exposed to Level I concentrations. The scoring cap was eliminated, and the multiplier (i.e., weight) is now 10.

Section 6.3.2.3 Level II concentrations. Explains how to evaluate populations exposed to Level II concentrations.

Section 6.3.2.4 Potential contamination. Explains how to assign values to populations potentially exposed to contamination from the site. The formula for calculating population values has been revised. Table 6-17, which assigns distance-weighted values for populations in each distance category, has been added. The values in the table were determined by statistical simulation to yield the same population, on average, as the use of the formulas in the proposed rule. The use of population ranges has been adopted as part of the simplification discussed in section III A. The rounding rule has been changed, the scoring cap was eliminated, and the multiplier (i.e., weight) is now 0.1.

Section 6.3.2.5 Calculation of the population factor value. Explains how to calculate the factor value. The scoring cap was eliminated.

Section 6.3.3 Resources. Explains how to assign points to resources, which in this pathway is based on the presence of commercial agriculture, commercial silviculture, and major or designated recreation areas.

Section 6.3.4 Sensitive environments. Explains how sensitive environments are evaluated based on actual and potential contamination. The maximum value that can be assigned to this factor is limited, but is greater than in the proposed rule. The limit is determined by scoring the pathway with only sensitive environments in the targets factor category; the pathway score under these conditions may not exceed 60 points.

Section 6.3.4.1 Actual contamination. Explains how to assign factor values for sensitive environments subject to actual contamination and how to assign values to wetlands based on total acreage. A new Table 6-18, Wetlands Rating Values for the Air Migration Pathway, has been added to assign values to wetlands based on acreage.

Section 6.3.4.2 Potential contamination. Explains how to calculate the factor value for potentially contaminated sensitive environments and how to assign values to wetlands based on total acreage within each distance category. The rounding rule has been changed.

Section 6.3.4.3 Calculation of sensitive environments factor value. Explains how to calculate the factor value. The rounding rule has been changed.

Section 6.3.5 Calculation of targets factor category value. Text has been revised to reflect the new names for factors.

Section 6.4 Calculation of air migration pathway score. Text has been revised to reflect the new divisor.

In addition to the above noted changes, the land use factor, Figure 2-2, and Tables 2-2, 2-3, 2-13, 2-17, and 2-19 in the proposed rule have been removed.

Section 7 Sites Containing Radioactive Substances

This entire part of the rule is new. As discussed in section III E of the preamble, this section has been added to provide direction on evaluating sites containing radioactive substances. Table 7-1 lists factors evaluated differently for such sites.

Section 7.1 Likelihood of release/ likelihood of exposure. Explains the approach to evaluating the factor category.

Section 7.1.1 Observed release/ observed contamination. Explains how to evaluate observed release (observed contamination) for radionuclides. The evaluation differs for radionuclides that occur naturally or are ubiquitous in the environment, for man-made radionuclides without ubiquitous background concentrations in the environment, and for gamma-emitting radionuclides in the soil exposure pathway. This section also explains the appropriate procedures for sites with mixed radioactive and other hazardous substances.

Section 7.1.2 Potential to release. Explains that potential to release factors are evaluated on the physical and chemical properties of radionuclides, not their radioactivity.

Section 7.2 Waste characteristics. Lists the factors evaluated.

Section 7.2.1 Human toxicity. Explains how to assign toxicity values to radioactive substances and describes appropriate procedures for sites containing mixed radionuclides and other hazardous substances.

Section 7.2.2 Ecosystem toxicity. Explains that ecosystem toxicity for radionuclides is assigned a value in the same way as is human toxicity except that the default value is 100 rather than 1,000.

Section 7.2.3 Persistence. Explains that radioactive substances are assigned persistence values based solely on half-life—radioactive half-life and volatilization half-life. Explains how to evaluate persistence for mixed radioactive and other hazardous substances.

Section 7.2.4 Selection of the substance potentially posing greatest hazard. The section explains how to select the substance potentially posing the greatest hazard.

Section 7.2.5 Hazardous waste quantity. Explains how to evaluate the hazardous waste quantity factor for sites containing radioactive substances.

Section 7.2.5.1 Source hazardous waste quantity for radionuclides. Describes differences between the migration pathways and the soil exposure pathway.

Section 7.2.5.1.1 Radionuclide constituent quantity (Tier A). Explains how to evaluate radionuclide constituent quantity for radionuclides.

Section 7.2.5.1.2 Radionuclide wastestream quantity (Tier B). Explains how to evaluate radionuclide wastestream quantity for radionuclides.

Section 7.2.5.1.3 Calculation of source hazardous waste quantity value for radionuclides. Explains how to assign a source value.

Section 7.2.5.2 Calculation of hazardous waste quantity factor value for radionuclides. Explains how to calculate the hazardous waste quantity factor value for radionuclides and describes use of the minimum value, which is either 10 or 100 (as described in section 2.4.2.2 above).

Section 7.2.5.3 Calculation of hazardous waste quantity factor value for sites containing mixed radioactive and other hazardous substances. Explains how to calculate the factor value for these sites.

Section 7.3 Targets. Explains how to evaluate targets at sites containing radioactive substances and sites containing radioactive and other hazardous substances.

Section 7.3.1 Level of contamination at a sampling location. Explains how to determine the appropriate level of contamination.

Section 7.3.2 Selection of benchmarks and comparisons with observed release/observed contamination. This section lists the benchmarks and explains how they are used in determining the level of contamination.

V. Required Analyses

A. Executive Order No. 12291

Under Executive Order No. 12291, the Agency must judge whether a regulation is "major" and thus subject to the requirement of a Regulatory Impact Analysis. The rule published today is not major because the rule will not result in an effect on the economy of $100 million or more, will not result in increased costs or prices, will not have significant adverse effects on competition, employment, investment, productivity, and innovation, and will not significantly disrupt domestic and export markets.

To estimate the costs associated with the final rule, a final economic analysis entitled "Economic Impact Analysis of the Revised Hazard Ranking System" was prepared as an addendum to the December 1987 economic impact analysis (EIA) to incorporate new data. As in the January 1988 EIA, the total annual cost of implementing the final rule is estimated as a function of the number of Screening SIs (SSI) and Listing SIs (LSI) that will be conducted annually and the unit cost of each. In the January 1988 EIA, estimates of total costs were developed assuming 1,130 SSIs and 100 LSIs would be conducted annually. The Agency now estimates that 1,100 SIs will be conducted annually (EPA is no longer using the terms SSI and LSI). The total annual cost is estimated to be $78.8 million, the sum of the cost of conducting 1,000 SIs at a unit cost of $55,000, 70 SIs for NPL sites (without monitoring wells) at a unit cost of $100,000, and 30 SIs for NPL sites (with monitoring wells) at a unit cost of $160,000.

To estimate the incremental cost of implementing the final revised version of the HRS, the unit cost of conducting all preremedial listing activities using the current HRS from the January 1988 EIA is updated. That cost was estimated to be $58,200 in the January 1988 EIA, and was developed assuming the PA had already been conducted. The 1988 estimate is a function of 480 hours of Field Investigation Team (FIT) technical time valued at $40 per hour and 30 samples being evaluated at a unit cost of $1,300 per sample. To compare the costs of the current HRS to those developed above for the final revised version of the HRS, the FIT technical time is valued at $50 per hour and each sample evaluation is estimated to cost $1,000. The revised total cost of conducting all listing activities beyond the PA for the current HRS, therefore, is estimated to be $54,000. In addition, the average level of effort for a PA under the current HRS is estimated to be 60 hours, and the unit cost of the PA, assuming a $50 FIT hourly rate, is estimated to be $3,000.

Based on these revisions, the annual cost of using the current HRS is estimated to be $65.4 million, the sum of the cost of conducting 2,000 PAs at a unit cost of $3,000 ($6 million) and the cost of conducting 1,100 SIs at a unit cost of $54,000 ($59.4 million). Compared to the current HRS, the annual incremental cost of using the final revised version of the HRS is estimated to be $13.4 million. On the basis of this evaluation, implementing the final revised version of the HRS would not constitute a major rule, because the annual incremental cost of the final rule is less than $100 million. No negative economic effects are anticipated from this rule.

B. Regulatory Flexibility Determination

Appendix A of the December 1987 EIA includes an assessment of the ability of responsible parties to pay the costs of HRS scoring under the current HRS and the three alternative scoring mechanisms considered at that time. That analysis evaluated the impact of HRS costs under each ranking methodology on the financial viability of 15 sample companies. Under that analysis, only the smallest sample firm (one with an average net income of $53,700) was expected to have difficulty in paying the costs of conducting a complete SI under each of the alternative ranking scenarios. The new unit cost of a complete SI developed during the Phase I field test and used in this economic analysis falls within the range of costs already evaluated in appendix A of the December 1987 EIA. Given the previous analysis, EPA concludes that most sample firms are healthy enough financially to be able to afford the expenditures associated with HRS site inspections. Responsible Parties (RPs) that are financially similar to the smallest firm (Firm 15 in appendix A of the December 1987 RIA), however, do not have the assets or the income to enable them to assume payments similar to the estimates derived for the SI done under the current HRS or the final revised version of the HRS.

The Regulatory Flexibility Act of 1980 requires that Federal agencies explicitly consider the effects of proposed and existing regulations on small entities and examine alternative regulations that would reduce significant adverse impacts on small entities. The small entities that could be affected by the revisions to the HRS are small businesses and small municipalities that are responsible for hazardous wastes at a site. Based on the updated analysis presented here, EPA concludes that using the final rule is unlikely to result in a significant impact on a substantial number of small entities. As discussed in the December 1987 EIA, this conclusion is drawn because small firms are no more or less likely to be responsible parties than are large firms. In addition, when they are RPs, small firms usually are one of several companies responsible for a site and probably would not bear the full burden of liability for HRS expenditures and other cleanup costs.

C. Paperwork Reduction Act

The information collection requirements contained in this rule have been approved by the Office of Management and Budget (OMB) under the provisions of the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.*, and has assigned OMB control number 2050-0095.

Public reporting burden for this collection of information is estimated to be 620 hours per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Chief, Information Policy Branch, PM—U.S. Environmental Protection Agency, 401 M St., SW., Washington, DC 20460; and the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503, marked "Attention: Desk Officer for EPA."

D. Federalism Implications

E.O. 12612 requires agencies to assess whether a regulation will have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. EPA has determined that this regulation does not have federalism implications and that, therefore, a Federalism Assessment is not required.

List of Subjects in 40 CFR Part 300

Air pollution controls, Chemicals, Hazardous materials, Intergovernmental relations, Natural resources, Oil pollution, Reporting and recordkeeping, Superfund, Waste treatment and disposal, Water pollution control, Water supply.

Dated: November 9, 1990.

William K. Reilly,

Administrator.

40 CFR part 300 is amended as follows:

PART 300—[AMENDED]

1. The authority citation for part 300 continues to read as follows:

Authority: 42 U.S.C. 9605; 33 U.S.C. 1321(c)(2); E.O. No. 117535, 38 FR 21243; E.O No. 12580, 52 FR 2923.

2. Part 300, appendix A is revised to read as follows:

Appendix A to Part 300—The Hazard Ranking System

Table of Contents

List of Figures

Figure number

List of Tables

Table number

1.0 Introduction

The Hazard Ranking System (HRS) is the principal mechanism the U.S. Environmental Protection Agency (EPA) uses to place sites on the National Priorities List (NPL). The HRS serves as a screening device to evaluate the potential for releases of uncontrolled hazardous substances to cause human health or environmental damage. The HRS provides a measure of relative rather than absolute risk. It is designed so that it can be consistently applied to a wide variety of sites.

1.1 Definitions

Acute toxicity: Measure of toxicological responses that result from a single exposure to a substance or from multiple exposures within a short period of time (typically several days or less). Specific measures of acute toxicity used within the HRS include lethal dose$_{50}$ (LD_{50}) and lethal concentration$_{50}$ (LC_{50}), typically measured within a 24-hour to 96-hour period.

Ambient Aquatic Life Advisory Concentrations (AALACs): EPA's advisory concentration limit for acute or chronic toxicity to aquatic organisms as established under section 304(a)(1) of the Clean Water Act, as amended.

Ambient Water Quality Criteria (AWQC): EPA's maximum acute or chronic toxicity concentrations for protection of aquatic life and its uses as established under section 304(a)(1) of the Clean Water Act, as amended.

Bioconcentration factor (BCF): Measure of the tendency for a substance to accumulate in the tissue of an aquatic organism. BCF is determined by the extent of partitioning of a substance, at equilibrium, between the tissue of an aquatic organism and water. As the ratio of concentration of a substance in the organism divided by the concentration in water, higher BCF values reflect a tendency for substances to accumulate in the tissue of aquatic organisms. (unitless).

Biodegradation: Chemical reaction of a substance induced by enzymatic activity of microorganisms.

CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (Pub. L. 96-510, as amended).

Chronic toxicity: Measure of toxicological responses that result from repeated exposure to a substance over an extended period of time (typically 3 months or longer). Such responses may persist beyond the exposure or may not appear until much later in time than the exposure. HRS measures of chronic toxicity include Reference Dose (RfD) values.

Contract Laboratory Program (CLP): Analytical program developed for CERCLA waste site samples to fill the need for legally defensible analytical results supported by a high level of quality assurance and documentation.

Contract-Required Detection Limit (CRDL). Term equivalent to contract-required quantitation limit, but used primarily for inorganic substances.

Contract-Required Quantitation Limit (CRQL): Substance-specific level that a CLP laboratory must be able to routinely and reliably detect in specific sample matrices. It is not the lowest detectable level achievable, but rather the level that a CLP laboratory should reasonably quantify. The CRQL may or may not be equal to the quantitation limit of a given substance in a given sample. For HRS purposes, the term CRQL refers to both the contract-required quantitation limit and the contract-required detection limit.

Curie (Ci): Measure used to quantify the amount of radioactivity. One curie equals 37 billion nuclear transformations per second, and one picocurie (pCi) equals 10^{-12} Ci.

Decay product: Isotope formed by the radioactive decay of some other isotope. This newly formed isotope possesses physical and chemical properties that are different from those of its parent isotope, and may also be radioactive.

Detection Limit (DL): Lowest amount that can be distinguished from the normal random "noise" of an analytical instrument or method. For HRS purposes, the detection limit used is the method detection limit (MDL) or, for real-time field instruments, the detection limit of the instrument as used in the field.

Dilution weight: Parameter in the HRS surface water migration pathway that reduces the point value assigned to targets as the flow or depth of the relevant surface water body increases. [unitless].

Distance weight: Parameter in the HRS air migration, ground water migration, and soil exposure pathways that reduces the point value assigned to targets as their distance increases from the site. [unitless].

Distribution coefficient (K_d): Measure of the extent of partitioning of a substance between geologic materials (for example, soil, sediment, rock) and water (also called partition coefficient). The distribution coefficient is used in the HRS in evaluating the mobility of a substance for the ground water migration pathway. [ml/g].

ED_{10} (10 percent effective dose): Estimated dose associated with a 10 percent increase in response over control groups. For HRS purposes, the response considered is cancer. [milligrams toxicant per kilogram body weight per day (mg/kg-day)].

Food and Drug Administration Action Level (FDAAL): Under section 408 of the Federal Food, Drug and Cosmetic Act, as amended, concentration of a poisonous or deleterious substance in human food or animal feed at or above which FDA will take legal action to remove adulterated products from the market. Only FDAALs established for fish and shellfish apply in the HRS.

Half-life: Length of time required for an initial concentration of a substance to be halved as a result of loss through decay. The HRS considers five decay processes: biodegradation, hydrolysis, photolysis, radioactive decay, and volatilization.

Hazardous substance: CERCLA hazardous substances, pollutants, and contaminants as defined in CERCLA sections 101(14) and 101(33), except where otherwise specifically noted in the HRS.

Hazardous wastestream: Material containing CERCLA hazardous substances (as defined in CERCLA section 101(14)) that was deposited, stored, disposed, or placed in, or that otherwise migrated to, a source.

HRS *"factor":* Primary rating elements internal to the HRS.

HRS *"factor category":* Set of HRS factors (that is, likelihood of release [or exposure], waste characteristics, targets).

HRS *"migration pathways":* HRS ground water, surface water, and air migration pathways.

HRS *"pathway":* Set of HRS factor categories combined to produce a score to measure relative risks posed by a site in one of four environmental pathways (that is, ground water, surface water, soil, and air).

HRS *"site score":* Composite of the four HRS pathway scores.

Henry's law constant: Measure of the volatility of a substance in a dilute solution of water at equilibrium. It is the ratio of the vapor pressure exerted by a substance in the gas phase over a dilute aqueous solution of that substance to its concentration in the solution at a given temperature. For HRS purposes, use the value reported at or near 25° C. [atmosphere-cubic meters per mole (atm-m^3/mol)].

Hydrolysis: Chemical reaction of a substance with water.

Karst: Terrain with characteristics of relief and drainage arising from a high degree of rock solubility in natural waters. The majority of karst occurs in limestones, but karst may also form in dolomite, gypsum, and salt deposits. Features associated with karst terrains typically include irregular topography, sinkholes, vertical shafts, abrupt ridges, caverns, abundant springs, and/or disappearing streams. Karst aquifers are associated with karst terrain.

LC_{50} (lethal concentration, 50 percent): Concentration of a substance in air [typically micrograms per cubic meter (µg/m^3)] or water [typically micrograms per liter (µg/l)] that kills 50 percent of a group of exposed organisms. The LC_{50} is used in the HRS in assessing acute toxicity.

LD_{50} (lethal dose, 50 percent): Dose of a substance that kills 50 percent of a group of exposed organisms. The LD_{50} is used in the HRS in assessing acute toxicity [milligrams toxicant per kilogram body weight (mg/kg)].

Maximum Contaminant Level (MCL): Under section 1412 of the Safe Drinking Water Act, as amended, the maximum permissible concentration of a substance in water that is delivered to any user of a public water supply.

Maximum Contaminant Level Goal (MCLG): Under section 1412 of the Safe Drinking Water Act, as amended, a nonenforceable concentration for a substance in drinking water that is protective of adverse human health effects and allows an adequate margin of safety.

Method Detection Limit (MDL): Lowest concentration of analyte that a method can detect reliably in either a sample or blank.

Mixed radioactive and other hazardous substances: Material containing both radioactive hazardous substances and nonradioactive hazardous substances, regardless of whether these types of substances are physically separated, combined chemically, or simply mixed together.

National Ambient Air Quality Standards (NAAQS): Primary standards for air quality established under sections 108 and 109 of the Clean Air Act, as amended.

National Emission Standards for Hazardous Air Pollutants (NESHAPs): Standards established for substances listed under section 112 of the Clean Air Act, as amended. Only those NESHAPs promulgated in ambient concentration units apply in the HRS.

Octanol-water partition coefficient (K_{ow} for P): Measure of the extent of partitioning of a substance between water and octanol at equilibrium. The K_{ow} is determined by the ratio between the concentration in octanol divided by the concentration in water at equilibrium. [unitless].

Organic carbon partition coefficient (K_{oc}): Measure of the extent of partitioning of a substance, at equilibrium, between organic carbon in geologic materials and water. The higher the K_{oc}, the more likely a substance is to bind to geologic materials than to remain in water. [ml/g].

Photolysis: Chemical reaction of a substance caused by direct absorption of solar energy (direct photolysis) or caused by other substances that absorb solar energy (indirect photolysis).

Radiation: Particles (alpha, beta, neutrons) or photons (x- and gamma-rays) emitted by radionuclides.

Radioactive decay: Process of spontaneous nuclear transformation, whereby an isotope of one element is transformed into an isotope of another element, releasing excess energy in the form of radiation.

Radioactive half-life: Time required for one-half the atoms in a given quantity of a specific radionuclide to undergo radioactive decay.

Radioactive substance: Solid, liquid, or gas containing atoms of a single radionuclide or multiple radionuclides.

Radioactivity: Property of those isotopes of elements that exhibit radioactive decay and emit radiation.

Radionuclide/radioisotope: Isotope of an element exhibiting radioactivity. For HRS purposes, "radionuclide" and "radioisotope" are used synonymously.

Reference dose (RfD): Estimate of a daily exposure level of a substance to a human population below which adverse noncancer health effects are not anticipated. [milligrams toxicant per kilogram body weight per day (mg/kg-day)].

Removal action: Action that removes hazardous substances from the site for proper disposal or destruction in a facility permitted under the Resource Conservation and Recovery Act or the Toxic Substances Control Act or by the Nuclear Regulatory Commission.

Roentgen (R): Measure of external exposures to ionizing radiation. One roentgen equals that amount of x-ray or gamma radiation required to produce ions carrying a charge of 1 electrostatic unit (esu) in 1 cubic centimeter of dry air under standard conditions. One microroentgen (µR) equals 10^{-6}R.

Sample quantitation limit (SQL): Quantity of a substance that can be reasonably quantified given the limits of detection for the methods of analysis and sample characteristics tha may affect quantitation (for example, dilution, concentration).

Screening concentration: Media-specific benchmark concentration for a hazardous substance that is used in the HRS for comparison with the concentration of that hazardous substance in a sample from that media. The screening concentration for a specific hazardous substance corresponds to its reference dose for inhalation exposures or for oral exposures, as appropriate, and, if the substance is a human carcinogen with a weight-of-evidence classification of A, B, or C, to that concentration that corresponds to its 10^{-6} individual lifetime excess cancer risk for inhalation exposures or for oral exposures, as appropriate.

Site: Area(s) where a hazardous substance has been deposited, stored, disposed, or placed, or has otherwise come to be located. Such areas may include multiple sources and may include the area between sources.

Slope factor (also referred to as cancer potency factor): Estimate of the probability of response (for example, cancer) per unit intake of a substance over a lifetime. The slope factor is typically used to estimate upper-bound probability of an individual developing cancer as a result of exposure to a particular level of a human carcinogen with a weight-of-evidence classification of A, B, or C. $[(mg/kg\text{-}day)^{-1}$ for non-radioactive substances and $(pCi)^{-1}$ for radioactive substances].

Source: Any area where a hazardous substance has been deposited, stored, disposed, or placed, plus those soils that have become contaminated from migration of a hazardous substance. Sources do not include those volumes of air, ground water, surface water, or surface water sediments that have become contaminated by migration, except: in the case of either a ground water plume with no identified source or contaminated surface water sediments with no identified source, the plume or contaminated sediments may be considered a source.

Target distance limit: Maximum distance over which targets for the site are evaluated. The target distance limit varies by HRS pathway.

Uranium Mill Tailings Radiation Control Act (UMTRCA) Standards: Standards for radionuclides established under sections 102, 104, and 108 of the Uranium Mill Tailings Radiation Control Act, as amended.

Vapor pressure: Pressure exerted by the vapor of a substance when it is in equilibrium with its solid or liquid form at a given temperature. For HRS purposes, use the value reported at or near 25° C. (atmosphere or torr).

Volatilization: Physical transfer process through which a substance undergoes a change of state from a solid or liquid to a gas.

Water solubility: Maximum concentration of a substance in pure water at a given temperature. For HRS purposes, use the value reported at or near 25° C. (milligrams per liter (mg/l)).

Weight-of-evidence: EPA classification system for characterizing the evidence supporting the designation of a substance as a human carcinogen. EPA weight-of-evidence groupings include:

Group A: Human carcinogen—sufficient evidence of carcinogenicity in humans.

Group B1: Probable human carcinogen—limited evidence of carcinogenicity in humans.

Group B2: Probable human carcinogen—sufficient evidence of carcinogenicity in animals.

Group C: Possible human carcinogen—limited evidence of carcinogenicity in animals.

Group D: Not classifiable as to human carcinogenicity—applicable when there is no animal evidence, or when human or animal evidence is inadequate.

Group E: Evidence of noncarcinogenicity for humans.

2.0 Evaluations Common to Multiple Pathways

2.1 *Overview.* The HRS site score (S) is the result of an evaluation of four pathways:

- Ground Water Migration (S_{gw}).
- Surface Water Migration (S_{sw}).
- Soil Exposure (S_s).
- Air Migration (S_a).

The ground water and air migration pathways use single threat evaluations, while the surface water migration and soil exposure pathways use multiple threat evaluations. Three threats are evaluated for the surface water migration pathway: drinking water, human food chain, and environmental. These threats are evaluated for two separate migration components—overland/flood migration and ground water to surface water migration. Two threats are evaluated for the soil exposure pathway: resident population and nearby population.

The HRS is structured to provide a parallel evaluation for each of these pathways and threats. This section focuses on these parallel evaluations, starting with the calculation of the HRS site score and the individual pathway scores.

2.1.1 *Calculation of HRS site score.* Scores are first calculated for the individual pathways as specified in sections 2 through 7 and then are combined for the site using the following root-mean-square equation to determine the overall HRS site score, which ranges from 0 to 100:

$$S = \sqrt{\frac{S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2}{4}}$$

2.1.2 *Calculation of pathway score.* Table 2-1, which is based on the air migration pathway, illustrates the basic parameters used to calculate a pathway score. As Table 2-1 shows, each pathway (or threat) score is the product of three "factor categories": likelihood of release, waste characteristics, and targets. (The soil exposure pathway uses likelihood of exposure rather than likelihood of release.) Each of the three factor categories contains a set of factors that are assigned numerical values and combined as specified in sections 2 through 7. The factor values are rounded to the nearest integer, except where otherwise noted.

2.1.3 *Common evaluations.* Evaluations common to all four HRS pathways include:

- Characterizing sources.
  - –Identifying sources (and, for the soil exposure pathway, areas of observed contamination (see section 5.0.1)).
  - –Identifying hazardous substances associated with each source (or area of observed contamination).
  - –Identifying hazardous substances available to a pathway.

TABLE 2-1.—SAMPLE PATHWAY SCORESHEET

Factor category	Maximum value	Value assigned
Likelihood of Release		
1. Observed Release	550	
2. Potential to Release	500	
3. Likelihood of Release (higher of lines 1 and 2)	550	
Waste Characteristics		
4. Toxicity/Mobility	(a)	
5. Hazardous Waste Quantity	(a)	
6. Waste Characteristics	100	
Targets		
7. Nearest Individual		
7a. Level I	50	
7b. Level II	45	
7c. Potential Contamination	20	
7d. Nearest Individual (higher of lines 7a, 7b, or 7c)	50	
8. Population		
8a. Level I	(b)	
8b. Level II	(b)	
8c. Potential Contamination	(b)	
8d. Total Population (lines 8a+8b+8c)	(b)	
9. Resources	5	
10. Sensitive Environments	(b)	
10a. Actual Contamination	(b)	
10b. Potential Contamination	(b)	
10c. Sensitive Environments (lines 10a+10b)	(b)	
11. Targets (lines 7d+8d+9+10c)	(b)	

12. Pathway Score is the product of Likelihood of Release, Waste Characteristics, and Targets, divided by 82,500. Pathway scores are limited to a maximum of 100 points.

[a] Maximum value applies to waste characteristics category. The product of lines 4 and 5 is used in Table 2-7 to derive the value for the waste characteristics factor category.

[b] There is no limit to the human population or sensitive environments factor values. However, the pathway score based solely on sensitive environments is limited to a maximum of 60 points.

- Scoring likelihood of release (or likelihood of exposure) factor category.
  - –Scoring observed release (or observed contamination).
  - –Scoring potential to release when there is no observed release.
- Scoring waste characteristics factor category.
  - –Evaluating toxicity.
  - –Combining toxicity with mobility, persistence, and/or bioaccumulation (or ecosystem bioaccumulation) potential, as appropriate to the pathway (or threat).
  - –Evaluating hazardous waste quantity.
  - –Combining hazardous waste quantity with the other waste characteristics factors.
  - –Determining waste characteristics factor category value.
- Scoring targets factor category.
  - –Determining level of contamination for targets.

These evaluations are essentially identical for the three migration pathways (ground water, surface water, and air). However, the evaluations differ in certain respects for the soil exposure pathway.

Section 7 specifies modifications that apply to each pathway when evaluating sites containing radioactive substances.

Section 2 focuses on evaluations common at the pathway and threat levels. Note that for the ground water and surface water migration pathways, separate scores are calculated for each aquifer (see section 3.0) and each watershed (see sections 4.1.1.3 and 4.2.1.5) when determining the pathway scores for a site. Although the evaluations in section 2 do not vary when different aquifers or watersheds are scored at a site, the specific factor values (for example, observed release, hazardous waste quantity, toxicity/mobility) that result from these evaluations can vary by aquifer and by watershed at the site. This can occur through differences both in the specific sources and targets eligible to be evaluated for each aquifer and watershed and in whether observed releases can be established for each aquifer and watershed. Such differences in scoring at the aquifer and watershed level are addressed in sections 3 and 4, not section 2.

2.2 *Characterize sources.* Source characterization includes identification of the following:

- Sources (and areas of observed contamination) at the site.
- Hazardous substances associated with these sources (or areas of observed contamination).
- Pathways potentially threatened by these hazardous substances.

Table 2-2 presents a sample worksheet for source characterization.

2.2.1 *Identify sources.* For the three migration pathways, identify the sources at the site that contain hazardous substances. Identify the migration pathway(s) to which each source applies. For the soil exposure pathway, identify areas of observed contamination at the site (see section 5.0.1).

TABLE 2-2.—SAMPLE SOURCE CHARACTERIZATION WORKSHEET

Source: ___________

A. Source dimensions and hazardous waste quantity.

Hazardous constituent quantity: ______

Hazardous wastestream quantity: ______

Volume: ______

Area: ______

Area of observed contamination: ______

B. Hazardous substances associated with the source.

Hazardous substance	Available to pathway						
	Air		Ground water (GW)	Surface water (SW)		Soil	
	Gas	Particulate		Overland/flood	GW to SW	Resident	Nearby

2.2.2 *Identify hazardous substances associated with a source.* For each of the three migration pathways, consider those hazardous substances documented in a source (for example, by sampling, labels, manifests, oral or written statements) to be associated with that source when evaluating each pathway. In some instances, a hazardous substance can be documented as being present at a site (for example, by labels, manifests, oral or written statements), but the specific source(s) containing that hazardous substance cannot be documented. For the three migration pathways, in those instances when the specific source(s) cannot be documented for a hazardous substance, consider the hazardous substance to be present in each source at the site, except sources for which definitive information indicates that the hazardous substance was not or could not be present.

For an area of observed contamination in the soil exposure pathway, consider only those hazardous substances that meet the criteria for observed contamination for that area (see section 5.0.1) to be associated with that area when evaluating the pathway.

2.2.3 *Identify hazardous substances available to a pathway.* In evaluating each migration pathway, consider the following hazardous substances available to migrate from the sources at the site to the pathway:

- Ground water migration.
  - –Hazardous substances that meet the criteria for an observed release (see section 2.3) to ground water.
  - –All hazardous substances associated with a source with a ground water containment factor value greater than 0 (see section 3.1.2.1).
- Surface water migration—overland/flood component.
  - –Hazardous substances that meet the criteria for an observed release to surface water in the watershed being evaluated.
  - –All hazardous substances associated with a source with a surface water containment factor value greater than 0 for the watershed (see sections 4.1.2.1.2.1.1 and 4.1.2.1.2.2.1).
- Surface water migration—ground water to surface water component.
  - –Hazardous substances that meet the criteria for an observed release to ground water.
  - –All hazardous substances associated with a source with a ground water containment factor value greater than 0 (see sections 4.2.2.1.2 and 3.1.2.1).
- Air migration.
  - –Hazardous substances that meet the criteria for an observed release to the atmosphere.
  - –All gaseous hazardous substances associated with a source with a gas containment factor value greater than 0 (see section 6.1.2.1.1).
  - –All particulate hazardous substances associated with a source with a particulate containment factor value greater than 0 (see section 6.1.2.2.1).
- For each migration pathway, in those instances when the specific source(s) containing the hazardous substance cannot be documented, consider that hazardous substance to be available to migrate to the pathway when it can be associated (see section 2.2.2) with at least one source having a containment factor value greater than 0 for that pathway.

In evaluating the soil exposure pathway, consider the following hazardous substances available to the pathway:

• Soil exposure—resident population threat.

–All hazardous substances that meet the criteria for observed contamination at the site (see section 5.0.1).

• Soil exposure—nearby population threat.

–All hazardous substances that meet the criteria for observed contamination at areas with an attractiveness/accessibility factor value greater than 0 (see section 5.2.1.1).

2.3 *Likelihood of release.* Likelihood of release is a measure of the likelihood that a waste has been or will be released to the environment. The likelihood of release factor category is assigned the maximum value of 550 for a migration pathway whenever the criteria for an observed release are met for that pathway. If the criteria for an observed release are met, do not evaluate potential to release for that pathway. When the criteria for an observed release are not met, evaluate potential to release for that pathway, with a maximum value of 500. The evaluation of potential to release varies by migration pathway (see sections 3, 4 and 6).

Establish an observed release either by direct observation of the release of a hazardous substance into the media being evaluated (for example, surface water) or by chemical analysis of samples appropriate to the pathway being evaluated (see sections 3, 4, and 6). The minimum standard to establish an observed release by chemical analysis is analytical evidence of a hazardous substance in the media significantly above the background level. Further, some portion of the release must be attributable to the site. Use the criteria in Table 2-3 as the standard for determining analytical significance. (The criteria in Table 2-3 are also used in establishing observed contamination for the soil exposure pathway, see section 5.0.1.) Separate criteria apply to radionuclides (see section 7.1.1).

TABLE 2-3.—OBSERVED RELEASE CRITERIA FOR CHEMICAL ANALYSIS

Sample Measurement < Sample Quantitation Limit[a]

No observed release is established.

Sample Measurement ≥ SAMPLE QUANTITATION LIMIT[a]

An observed release is established as follows:

• If the background concentration is not detected (or is less than the detection limit), an observed release is established when the sample measurement equals or exceeds the sample quantitation limit.[a]

• If the background concentration equals or exceeds the detection limit, an observed release is established when the sample measurement is 3 times or more above the background concentration.

[a] If the sample quantitation limit (SQL) cannot be established, determined if there is an observed release as follows:

—If the sample analysis was performed under the EPA Contract Laboratory Program, use the EPA contract-required quantitation limit (CRQL) in place of the SQL.

—If the sample analysis is not performed under the EPA Contract Laboratory Program, use the detection limit (DL) in place of the SQL.

2.4 *Waste characteristics.* The waste characteristics factor category includes the following factors: hazardous waste quantity, toxicity, and as appropriate to the pathway or threat being evaluated, mobility, persistence, and/or bioaccumulation (or ecosystem bioaccumulation) potential.

2.4.1 *Selection of substance potentially posing greatest hazard.* For all pathways (and threats), select the hazardous substance potentially posing the greatest hazard for the pathway (or threat) and use that substance in evaluating the waste characteristics category of the pathway (or threat). For the three migration pathways (and threats), base the selection of this hazardous substance on the toxicity factor value for the substance, combined with its mobility, persistence, and/or bioaccumulation (or ecosystem bioaccumulation) potential factor values, as applicable to the migration pathway (or threat). For the soil exposure pathway, base the selection on the toxicity factor alone.

Evaluation of the toxicity factor is specified in section 2.4.1.1. Use and evaluation of the mobility, persistence, and/or bioaccumulation (or ecosystem bioaccumulation) potential factors vary by pathway (or threat) and are specified under the appropriate pathway (or threat) section. Section 2.4.1.2 identifies the specific factors that are combined with toxicity in evaluating each pathway (or threat).

2.4.1.1 *Toxicity factor.* Evaluate toxicity for those hazardous substances at the site that are available to the pathway being scored. For all pathways and threats, except the surface water environmental threat, evaluate human toxicity as specified below. For the surface water environmental threat, evaluate ecosystem toxicity as specified in section 4.1.4.2.1.1.

Establish human toxicity factor values based on quantitative dose-response parameters for the following three types of toxicity:

• Cancer—Use slope factors (also referred to as cancer potency factors) combined with weight-of-evidence ratings for carcinogenicity. If a slope factor is not available for a substance, use its ED_{10} value to estimate a slope factor as follows:

$$\text{Slope factor} = \frac{1}{6\,(ED_{10})}$$

• Noncancer toxicological responses of chronic exposure—use reference dose (RfD) values.

• Noncancer toxicological responses of acute exposure—use acute toxicity parameters, such as the LD_{50}.

Assign human toxicity factor values to a hazardous substance using Table 2-4, as follows:

• If RfD and slope factor values are both available for the hazardous substance, assign the substance a value from Table 2-4 for each. Select the higher of the two values assigned and use it as the overall toxicity factor value for the hazardous substance.

• If either an RfD or slope factor value is available, but not both, assign the hazardous substance an overall toxicity factor value from Table 2-4 based solely on the available value (RfD or slope factor).

• If neither an RfD nor slope factor value is available, assign the hazardous substance an overall toxicity factor value from Table 2-4 based solely on acute toxicity. That is, consider acute toxicity in Table 2-4 only when both RfD and slope factor values are not available.

• If neither an RfD, nor slope factor, nor acute toxicity value is available, assign the hazardous substance an overall toxicity factor value of 0 and use other hazardous substances for which information is available in evaluating the pathway.

TABLE 2-4.—TOXICITY FACTOR EVALUATION

Chronic Toxicity (Human)

Reference dose (RfD) (mg/kg-day)	Assigned value
RfD < 0.0005	10,000
0.0005 ≤ RfD < 0.005	1,000
0.005 ≤ RfD < 0.05	100
0.05 ≤ RfD < 0.5	10
0.5 ≤ RfD	1
RfD not available	0

Carcinogenicity (Human)

Weight-of-evidence[a]/slope factor (mg/kg-day)$^{-1}$			Assigned value
A	B	C	
0.5 ≤ SF[b]	5 ≤ SF	50 ≤ SF	10,000
0.05 ≤ SF < 0.5	0.5 ≤ SF < 5	5 ≤ SF < 50	1,000
SF < 0.05	0.05 ≤ SF < 0.5	0.5 ≤ SF < 5	100
— — —	SF < 0.05	SF < 0.5	10
Slope factor not available.	Slope factor not available.	Slope factor not available.	0

[a] A, B, and C refer to weight-of-evidence categories. Assign substances with a weight-of-evidence category of D (inadequate evidence of carcinogenicity) or E (evidence of lack of carcinogenicity) a value of 0 for carcinogenicity.

[b] SF = Slope factor.

TABLE 2-4.—TOXICITY FACTOR EVALUATION—CONCLUDED

Acute Toxicity (Human)

Oral LD_{50} (mg/kg)	Dermal LD_{50} (mg/kg)	Dust or mist LC_{50} (mg/l)	Gas or vapor LC_{50} (ppm)	Assigned value
— — —	— — —	— — —	— — —	— — —
$LD_{50} < 5$	$LD_{50} < 2$	$LC_{50} < 0.2$	$LC_{50} < 20$	1,000
$5 \le LD_{50} < 50$	$2 \le LD_{50} < 20$	$0.2 \le LC_{50} < 2$	$20 \le LC_{50} < 200$	100
$50 \le LD_{50} < 500$	$20 \le LD_{50} < 200$	$2 \le LC_{50} < 20$	$200 \le LC_{50} < 2{,}000$	10
$500 \le LD_{50}$	$200 \le LD_{50}$	$20 \le LC_{50}$	$2{,}000 \le LC_{50}$	1
LD_{50} not available	LD_{50} not available	LC_{50} not available	LC_{50} not available	0

If a toxicity factor value of 0 is assigned to all hazardous substances available to a particular pathway (that is, insufficient toxicity data are available for evaluating all the substances), use a default value of 100 as the overall human toxicity factor value for all hazardous substances available to the pathway. For hazardous substances having usable toxicity data for multiple exposure routes (for example, inhalation and ingestion), consider all exposure routes and use the highest assigned value, regardless of exposure route, as the toxicity factor value.

For HRS purposes, assign both asbestos and lead (and its compounds) a human toxicity factor value of 10,000.

Separate criteria apply for assigning factor values for human toxicity and ecosystem toxicity for radionuclides (see sections 7.2.1 and 7.2.2).

2.4.1.2 *Hazardous substance selection.* For each hazardous substance evaluated for a migration pathway (or threat), combine the human toxicity factor value (or ecosystem toxicity factor value) for the hazardous substance with a mobility, persistence, and/or bioaccumulation (or ecosystem bioaccumulation) potential factor value as follows:

- Ground water migration.
  - –Determine a combined human toxicity/mobility factor value for the hazardous substance (see section 3.2.1).
- Surface water migration-overland/flood migration component.
  - –Determine a combined human toxicity/persistence factor value for the hazardous substance for the drinking water threat (see section 4.1.2.2.1).
  - –Determine a combined human toxicity/persistence/bioaccumulation factor value for the hazardous substance for the human food chain threat (see section 4.1.3.2.1).
  - –Determine a combined ecosystem toxicity/persistence/bioaccumulation factor value for the hazardous substance for the environmental threat (see section 4.1.4.2.1).
- Surface water migration-ground water to surface water migration component.
  - –Determine a combined human toxicity/mobility/persistence factor value for the hazardous substance for the drinking water threat (see section 4.2.2.2.1).
  - –Determine a combined human toxicity/mobility/persistence/bioaccumulation factor value for the hazardous substance for the human food chain threat (see section 4.2.3.2.1).
  - –Determine a combined ecosystem toxicity/mobility/persistence/bioaccumulation factor value for the hazardous substance for the environmental threat (see section 4.2.4.2.1).
- Air migration.
  - –Determine a combined human toxicity/mobility factor value for the hazardous substance (see section 6.2.1).

Determine each combined factor value for a hazardous substance by multiplying the individual factor values appropriate to the pathway (or threat). For each migration pathway (or threat) being evaluated, select the hazardous substance with the highest combined factor value and use that substance in evaluating the waste characteristics factor category of the pathway (or threat).

For the soil exposure pathway, select the hazardous substance with the highest human toxicity factor value from among the substances that meet the criteria for observed contamination for the threat evaluated and use that substance in evaluating the waste characteristics factor category.

2.4.2 *Hazardous waste quantity.* Evaluate the hazardous waste quantity factor by first assigning each source (or area of observed contamination) a source hazardous waste quantity value as specified below. Sum these values to obtain the hazardous waste quantity factor value for the pathway being evaluated.

In evaluating the hazardous waste quantity factor for the three migration pathways, allocate hazardous substances and hazardous wastestreams to specific sources in the manner specified in section 2.2.2, except: consider hazardous substances and hazardous wastestreams that cannot be allocated to any specific source to constitute a separate "unallocated source" for purposes of evaluating only this factor for the three migration pathways. Do not, however, include a hazardous substance or hazardous wastestream in the unallocated source for a migration pathway if there is definitive information indicating that the substance or wastestream could only have been placed in sources with a containment factor value of 0 for that migration pathway.

In evaluating the hazardous waste quantity factor for the soil exposure pathway, allocate to each area of observed contamination only those hazardous substances that meet the criteria for observed contamination for that area of observed contamination and only those hazardous wastestreams that contain hazardous substances that meet the criteria for observed contamination for that area of observed contamination. Do not consider other hazardous substances or hazardous wastestreams at the site in evaluating this factor for the soil exposure pathway.

2.4.2.1 *Source hazardous waste quantity.* For each of the three migration pathways, assign a source hazardous waste quantity value to each source (including the unallocated source) having a containment factor value greater than 0 for the pathway being evaluated. Consider the unallocated source to have a containment factor value greater than 0 for each migration pathway.

For the soil exposure pathway, assign a source hazardous waste quantity value to each area of observed contamination, as applicable to the threat being evaluated.

For all pathways, evaluate source hazardous waste quantity using the following four measures in the following hierarchy:

- Hazardous constituent quantity.
- Hazardous wastestream quantity.
- Volume.
- Area.

For the unallocated source, use only the first two measures.

Separate criteria apply for assigning a source hazardous waste quantity value for radionuclides (see section 7.2.5).

2.4.2.1.1 *Hazardous constituent quantity.* Evaluate hazardous constituent quantity for the source (or area of observed contamination) based solely on the mass of CERCLA hazardous substances (as defined in CERCLA section 101(14), as amended) allocated to the source (or area of observed contamination), except:

- For a hazardous waste listed pursuant to section 3001 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976 (RCRA), 42 U.S.C. 6901 et seq., determine its mass for the evaluation of this measure as follows:
  - –If the hazardous waste is listed solely for Hazard Code T (toxic waste), include only the mass of constituents in the hazardous waste that are CERCLA hazardous substances and not the mass of the entire hazardous waste.
  - –If the hazardous waste is listed for any other Hazard Code (including T plus any other Hazard Code), include the mass of the entire hazardous waste.
- For a RCRA hazardous waste that exhibits the characteristics identified under section 3001 of RCRA, as amended, determine its mass for the evaluation of this measure as follows:

–If the hazardous waste exhibits only the characteristic of toxicity (or only the characteristic of EP toxicity), include only the mass of constituents in the hazardous waste that are CERCLA hazardous substances and not the mass of the entire hazardous waste.

–If the hazardous waste exhibits any other characteristic identified under section 3001 (including any other characteristic plus the characteristic of toxicity (or the characteristic of EP toxicity)), include the mass of the entire hazardous waste.

Based on this mass, designated as C, assign a value for hazardous constituent quantity as follows:

• For the migration pathways, assign the source a value for hazardous constituent quantity using the Tier A equation of Table 2-5.

• For the soil exposure pathway, assign the area of observed contamination a value using the Tier A equation of Table 5-2 (section 5.1.2.2).

If the hazardous constituent quantity for the source (or area of observed contamination) is adequately determined (that is, the total mass of all CERCLA hazardous substances in the source and releases from the source (or in the area of observed contamination) is known or is estimated with reasonable confidence), do not evaluate the other three measures discussed below. Instead assign these other three measures a value of 0 for the source (or area of observed contamination) and proceed to section 2.4.2.1.5.

If the hazardous constituent quantity is not adequately determined, assign the source (or area of observed contamination) a value for hazardous constituent quantity based on the available data and proceed to section 2.4.2.1.2.

TABLE 2-5.—HAZARDOUS WASTE QUANTITY EVALUATION EQUATIONS

Tier	Measure	Units	Equation for assigning value [a]
A	Hazardous constituent quantity (C)	lb	C
B [b]	Hazardous wastestream quantity (W)	lb	W/5,000
C [b]	Volume (V)		
	Landfill	yd^3	V/2,500
	Surface impoundment	yd^3	V/2.5
	Surface impoundment (buried/backfilled)	yd^3	V/2.5
	Drums [c]	gallon	V/500
	Tanks and containers other than drums	yd^3	V/2.5
	Contaminated soil	yd^3	V/2,500
	Pile	yd^3	V/2.5
	Other	yd^3	V/2.5
D [b]	Area (A)		
	Landfill	ft^2	A/3,400
	Surface impoundment	ft^2	A/13
	Surface impoundment (buried/backfilled)	ft^2	A/13
	Land treatment	ft^2	A/270
	Pile [d]	ft^2	A/13
	Contaminated soil	ft^2	A/34,000

TABLE 2-5.—HAZARDOUS WASTE QUANTITY EVALUATION EQUATIONS—Concluded

[a] Do not round to nearest integer.
[b] Convert volume to mass when necessary: 1 ton=2,000 pounds=1 cubic yard=4 drums=200 gallons.
[c] If actual volume of drums is unavailable, assume 1 drum=50 gallons.
[d] Use land surface area under pile, not surface area of pile.

2.4.2.1.2 *Hazardous wastestream quantity.* Evaluate hazardous wastestream quantity for the source (or area of observed contamination) based on the mass of hazardous wastestreams plus the mass of any additional CERCLA pollutants and contaminants (as defined in CERCLA section 101[33], as amended) that are allocated to the source (or area of observed contamination). For a wastestream that consists solely of a hazardous waste listed pursuant to section 3001 of RCRA, as amended or that consists solely of a RCRA hazardous waste that exhibits the characteristics identified under section 3001 of RCRA, as amended, include the mass of that entire hazardous waste in the evaluation of this measure.

Based on this mass, designated as W, assign a value for hazardous wastestream quantity as follows:

• For the migration pathways, assign the source a value for hazardous wastestream quantity using the Tier B equation of Table 2-5.

• For the soil exposure pathway, assign the area of observed contamination a value using the Tier B equation of Table 5-2 (section 5.1.2.2).

Do not evaluate the volume and area measures described below if the source is the unallocated source or if the following condition applies:

• The hazardous wastestream quantity for the source (or area of observed contamination) is adequately determined—that is, total mass of all hazardous wastestreams and CERCLA pollutants and contaminants for the source and releases from the source (or for the area of observed contamination) is known or is estimated with reasonable confidence.

If the source is the unallocated source or if this condition applies, assign the volume and area measures a value of 0 for the source (or area of observed contamination) and proceed to section 2.4.2.1.5. Otherwise, assign the source (or area of observed contamination) a value for hazardous wastestream quantity based on the available data and proceed to section 2.4.2.1.3.

2.4.2.1.3 *Volume.* Evaluate the volume measure using the volume of the source (or the volume of the area of observed contamination). For the soil exposure pathway, restrict the use of the volume measure to those areas of observed contamination specified in section 5.1.2.2.

Based on the volume, designated as V, assign a value to the volume measure as follows:

• For the migration pathways, assign the source a value for volume using the appropriate Tier C equation of Table 2-5.

• For the soil exposure pathway, assign the area of observed contamination a value for volume using the appropriate Tier C equation of Table 5-2 (section 5.1.2.2).

If the volume of the source (or volume of the area of observed contamination, if applicable) can be determined, do not evaluate the area measure. Instead, assign the area measure a value of 0 and proceed to section 2.4.2.1.5. If the volume cannot be determined (or is not applicable for the soil exposure pathway), assign the source (or area of observed contamination) a value of 0 for the volume measure and proceed to section 2.4.2.1.4.

2.4.2.1.4 *Area.* Evaluate the area measure using the area of the source (or the area of the area of observed contamination). Based on this area, designated as A, assign a value to the area measure as follows:

• For the migration pathways, assign the source a value for area using the appropriate Tier D equation of Table 2-5.

• For the soil exposure pathway, assign the area of observed contamination a value for area using the appropriate Tier D equation of Table 5-2 (section 5.1.2.2).

2.4.2.1.5 *Calculation of source hazardous waste quantity value.* Select the highest of the values assigned to the source (or area of observed contamination) for the hazardous constituent quantity, hazardous wastestream quantity, volume, and area measures. Assign this value as the source hazardous waste quantity value. Do not round to the nearest integer.

2.4.2.2 *Calculation of hazardous waste quantity factor value.* Sum the source hazardous waste quantity values assigned to all sources (including the unallocated source) or areas of observed contamination for the pathway being evaluated and round this sum to the nearest integer, except: if the sum is greater than 0, but less than 1, round it to 1. Based on this value, select a hazardous waste quantity factor value for the pathway from Table 2-6.

TABLE 2-6.—HAZARDOUS WASTE QUANTITY FACTOR VALUES

Hazardous waste quantity value	Assigned value
0	0
1 [a] to 100	1 [b]
Greater than 100 to 10,000	100
Greater than 10,000 to 1,000,000	10,000
Greater than 1,000,000	1,000,000

[a] If the hazardous waste quantity value is greater than 0, but less than 1, round it to 1 as specified in text.
[b] For the pathway, if hazardous constituent quantity is not adequately determined, assign a value as specified in the text; do not assign the value of 1.

For a migration pathway, if the hazardous constituent quantity is adequately determined (see section 2.4.2.1.1) for all sources (or all portions of sources and releases remaining after a removal action), assign the value from Table 2-6 as the hazardous waste quantity factor value for the pathway. If the hazardous constituent quantity is not adequately determined for one or more sources (or one or more portions of sources or releases remaining after a removal action) assign a factor value as follows:

• If any target for that migration pathway is subject to Level I or Level II concentrations (see section 2.5), assign either the value from Table 2-6 or a value of 100, whichever is greater, as the hazardous waste quantity factor value for that pathway.

• If none of the targets for that pathway is subject to Level I or Level II concentrations, assign a factor value as follows:

–If there has been no removal action, assign either the value from Table 2-6 or a value of 10, whichever is greater, as the hazardous waste quantity factor value for that pathway.

–If there has been a removal action:

– –Determine values from Table 2-6 with and without consideration of the removal action.

– –If the value that would be assigned from Table 2-6 without consideration of the removal action would be 100 or greater, assign either the value from Table 2-6 with consideration of the removal action or a value of 100, whichever is greater, as the hazardous waste quantity factor value for the pathway.

– –If the value that would be assigned from Table 2-6 without consideration of the removal action would be less than 100, assign a value of 10 as the hazardous waste quantity factor value for the pathway.

For the soil exposure pathway, if the hazardous constituent quantity is adequately determined for all areas of observed contamination, assign the value from Table 2-6 as the hazardous waste quantity factor value. If the hazardous constituent quantity is not adequately determined for one or more areas of observed contamination, assign either the value from Table 2-6 or a value of 10, whichever is greater, as the hazardous waste quantity factor value.

2.4.3 *Waste characteristics factor category value.* Determine the waste characteristics factor category value as specified in section 2.4.3.1 for all pathways and threats, except the surface water-human food chain threat and the surface water-environmental threat. Determine the waste characteristics factor category value for these latter two threats as specified in section 2.4.3.2.

2.4.3.1 *Factor category value.* For the pathway (or threat) being evaluated, multiply the toxicity or combined factor value, as appropriate, from section 2.4.1.2 and the hazardous waste quantity factor value from section 2.4.2.2, subject to a maximum product of 1×10^8. Based on this waste characteristics product, assign a waste characteristics factor category value to the pathway (or threat) from Table 2-7.

TABLE 2-7.—WASTE CHARACTERISTICS FACTOR CATEGORY VALUES

Waste characteristics product	Assigned value
0	0
Greater than 0 to less than 10	1
10 to less than 1×10^2	2
1×10^2 to less than 1×10^3	3
1×10^3 to less than 1×10^4	6
1×10^4 to less than 1×10^5	10
1×10^5 to less than 1×10^6	18
1×10^6 to less than 1×10^7	32
1×10^7 to less than 1×10^8	56
1×10^8 to less than 1×10^9	100
1×10^9 to less than 1×10^{10}	180
1×10^{10} to less than 1×10^{11}	320
1×10^{11} to less than 1×10^{12}	560
1×10^{12}	1,000

2.4.3.2 *Factor category value, considering bioaccumulation potential.* For the surface water-human food chain threat and the surface water-environmental threat, multiply the toxicity or combined factor value, as appropriate, from section 2.4.1.2 and the hazardous waste quantity factor value from section 2.4.2.2, subject to:

• A maximum product of 1×10^{12}, *and*

• A maximum product exclusive of the bioaccumulation (or ecosystem bioaccumulation) potential factor of 1×10^8.

Based on the total waste characteristics product, assign a waste characteristics factor category value to these threats from Table 2-7.

2.5 *Targets.*

The types of targets evaluated include the following:

• Individual (factor name varies by pathway and threat).

• Human population.

• Resources (these vary by pathway and threat).

• Sensitive environments (included for all pathways except ground water migration).

The factor values that may be assigned to each type of target have the same range for each pathway for which that type of target is evaluated. The factor value for most types of targets depends on whether the target is subject to actual or potential contamination for the pathway and whether the actual contamination is Level I or Level II:

• Actual contamination: Target is associated either with a sampling location that meets the criteria for an observed release (or observed contamination) for the pathway or with an observed release based on direct observation for the pathway (additional criteria apply for establishing actual contamination for the human food chain threat in the surface water migration pathway, see sections 4.1.3.3 and 4.2.3.3). sections 3 through 6 specify how to determine the targets associated with a sampling location or with an observed release based on direct observation. Determine whether the actual contamination is Level I or Level II as follows:

–Level I:

– –Media-specific concentrations for the target meet the criteria for an observed release (or observed contamination) for the pathway and are at or above media-specific benchmark values. These benchmark values (see section 2.5.2) include both screening concentrations and concentrations specified in regulatory limits (such as Maximum Contaminant Level (MCL) values), or

– –For the human food chain threat in the surface water migration pathway, concentrations in tissue samples from aquatic human food chain organisms are at or above benchmark values. Such tissue samples may be used in addition to media-specific concentrations only as specified in sections 4.1.3.3 and 4.2.3.3.

–Level II:

– –Media-specific concentrations for the target meet the criteria for an observed release (or observed contamination) for the pathway, but are less than media-specific benchmarks. If none of the hazardous substances eligible to be evaluated for the sampling location has an applicable benchmark, assign Level II to the actual contamination at the sampling location, or

– –For observed releases based on direct observation, assign Level II to targets as specified in sections 3, 4, and 6, or

– –For the human food chain threat in the surface water migration pathway, concentrations in tissue samples from aquatic human food chain organisms, when applicable, are below benchmark values.

–If a target is subject to both Level I and Level II concentrations for a pathway (or threat), evaluate the target using Level I concentrations for that pathway (or threat).

• Potential contamination: Target is subject to a potential release (that is, target is not associated with actual contamination for that pathway or threat).

Assign a factor value for individual risk as follows (select the highest value that applies to the pathway or threat):

• 50 points if any individual is exposed to Level I concentrations.

• 45 points if any individual is exposed to Level II concentrations.

• Maximum of 20 points if any individual is subject to potential contamination. The value assigned is 20 multiplied by the distance or dilution weight appropriate to the pathway.

Assign factor values for population and sensitive environments as follows:

• Sum Level I targets and multiply by 10. (Level I is not used for sensitive environments in the soil exposure and air migration pathways.)

• Sum Level II targets.

• Multiply potential targets by distance or dilution weights appropriate to the pathway, sum, and divide by 10. Distance or dilution weighting accounts for diminishing exposure with increasing distance or dilution within the different pathways.

• Sum the values for the three levels.

In addition, resource value points are assigned within all pathways for welfare-related impacts (for example, impacts to agricultural land), but do not depend on whether there is actual or potential contamination.

2.5.1 *Determination of level of actual contamination at a sampling location.* Determine whether Level I concentrations or Level II concentrations apply at a sampling location (and thus to the associated targets) as follows:

• Select the benchmarks applicable to the pathway (or threat) being evaluated.

• Compare the concentrations of hazardous substances in the sample (or comparable samples) to their benchmark concentrations for the pathway (or threat), as specified in section 2.5.2.

• Determine which level applies based on this comparison.

• If none of the hazardous substances eligible to be evaluated for the sampling location has an applicable benchmark, assign Level II to the actual contamination at that sampling location for the pathway (or threat).

In making the comparison, consider only those samples, and only those hazardous substances in the sample, that meet the criteria for an observed release (or observed contamination) for the pathway, except: tissue samples from aquatic human food chain organisms may also be used as specified in sections 4.1.3.3 and 4.2.3.3 of the surface water-human food chain threat. If any hazardous substance is present in more than one comparable sample for the sampling location, use the highest concentration of that hazardous substance from any of the comparable samples in making the comparisons.

Treat sets of samples that are not comparable separately and make a separate comparison for each such set.

2.5.2 *Comparison to benchmarks.* Use the following media-specific benchmarks for making the comparisons for the indicated pathway (or threat):

• Maximum Contaminant Level Goals (MCLGs)—ground water migration pathway and drinking water threat in surface water migration pathway. Use only MCLG values greater than 0.

• Maximum Contaminant Levels (MCLs)—ground water migration pathway and drinking water threat in surface water migration pathway.

• Food and Drug Administration Action Level (FDAAL) for fish or shellfish—human food chain threat in surface water migration pathway.

• EPA Ambient Water Quality Criteria (AWQC) for protection of aquatic life—environmental threat in surface water migration pathway.

• EPA Ambient Aquatic Life Advisory Concentrations (AALAC)—environmental threat in surface water migration pathway.

• National Ambient Air Quality Standards (NAAQS)—air migration pathway.

• National Emission Standards for Hazardous Air Pollutants (NESHAPs)—air migration pathway. Use only those NESHAPs promulgated in ambient concentration units.

• Screening concentration for cancer corresponding to that concentration that corresponds to the 10^{-6} individual cancer risk for inhalation exposures (air migration pathway) or for oral exposures (ground water migration pathway; drinking water and human food chain threats in surface water migration pathway; and soil exposure pathway).

• Screening concentration for noncancer toxicological responses corresponding to the RfD for inhalation exposures (air migration pathway) or for oral exposures (ground water migration pathway; drinking water and human food chain threats in surface water migration pathway; and soil exposure pathway).

Select the benchmark(s) applicable to the pathway (or threat) being evaluated as specified in sections 3 through 6. Compare the concentration of each hazardous substance from the sampling location to its benchmark concentration(s) for that pathway (or threat). Use only those samples and only those hazardous substances in the sample that meet the criteria for an observed release (or observed contamination) for the pathway, except: tissue samples from aquatic human food chain organisms may be used as specified in sections 4.1.3.3 and 4.2.3.3. If the concentration of any applicable hazardous substance from any sample equals or exceeds its benchmark concentration, consider the sampling location to be subject to Level I concentrations for that pathway (or threat). If more than one benchmark applies to the hazardous substance, assign Level I if the concentration of the hazardous substance equals or exceeds the lowest applicable benchmark concentration.

If no hazardous substance individually equals or exceeds its benchmark concentration, but more than one hazardous substance either meets the criteria for an observed release (or observed contamination) for the sample (or comparable samples) or is eligible to be evaluated for a tissue sample (see sections 4.1.3.3 and 4.2.3.3), calculate the indices I and J specified below based on these hazardous substances.

For those hazardous substances that are carcinogens (that is, those having a carcinogen weight-of-evidence classification of A, B, or C), calculate an index I for the sample location as follows:

$$I = \sum_{i=1}^{n} \frac{C_i}{SC_i}$$

where:

C_i = Concentration of hazardous substance i in sample (or highest concentration of hazardous substance i from among comparable samples).

SC_i = Screening concentration for cancer corresponding to that concentration that corresponds to its 10^{-6} individual cancer risk for applicable exposure (inhalation or oral) for hazardous substance i.

n = Number of applicable hazardous substances in sample (or comparable samples) that are carcinogens and for which an SC_i is available.

For those hazardous substances for which an RfD is available, calculate an index J for the sample location as follows:

$$J = \sum_{j=1}^{m} \frac{C_j}{CR_j}$$

where:

C_j = Concentration of hazardous substance j in sample (or highest concentration of hazardous substance j from among comparable samples).

CR_j = Screening concentration for noncancer toxicological responses corresponding to RfD for applicable exposure (inhalation or oral) for hazardous substance j.

m = Number of applicable hazardous substances in sample (or comparable samples) for which a CR_j is available.

If either I or J equals or exceeds 1, consider the sampling location to be subject to Level I concentrations for that pathway (or threat). If both I and J are less than 1, consider the sampling location to be subject to Level II concentrations for that pathway (or threat). If, for the sampling location, there are sets of samples that are not comparable, calculate I and J separately for each such set, and use the highest calculated values of I and J to assign Level I and Level II.

See sections 7.3.1 and 7.3.2 for criteria for determining the level of contamination for radioactive substances.

3.0 *Ground Water Migration Pathway*

Evaluate the ground water migration pathway based on three factor categories: likelihood of release, waste characteristics, and targets. Figure 3–1 indicates the factors included within each factor category.

Determine the ground water migration pathway score (S_{gw}) in terms of the factor category values as follows:

$$S_{gw} = \frac{(LR)(WC)(T)}{SF}$$

where:

LR = Likelihood of release factor category value.

WC = Waste characteristics factor category value.

T = Targets factor category value.

SF = Scaling factor.

Table 3–1 outlines the specific calculation procedure.

Calculate a separate ground water migration pathway score for each aquifer, using the factor category values for that aquifer for likelihood of release, waste characteristics, and targets. In doing so, include both the targets using water from that aquifer and the targets using water from all overlying aquifers through which the hazardous substances would migrate to reach the aquifer being evaluated. Assign the highest ground water migration pathway score that results for any aquifer as the ground water migration pathway score for the site.

BILLING CODE 6560-50-M

Likelihood of Release (LR)		Waste Characteristics (WC)		Targets (T)
Observed Release or Potential to Release • Containment • Net Precipitation • Depth to Aquifer • Travel Time	X	Toxicity/Mobility • Toxicity - Chronic - Carcinogenic - Acute • Mobility - Water Solubility - Distribution Coefficient (K_d) Hazardous Waste Quantity • Hazardous Constituent Quantity • Hazardous Wastestream Quantity • Volume • Area	X	Nearest Well Population • Level I Concentrations • Level II Concentrations • Potential Contamination Resources Wellhead Protection Area

FIGURE 3-1
OVERVIEW OF GROUND WATER MIGRATION PATHWAY

BILLING CODE 6560-50-C

TABLE 3-1.—GROUND WATER MIGRATION PATHWAY SCORESHEET

Factor categories and factors	Maximum value	Value assigned
Likelihood of Release to an Aquifer:		
1. Observed Release	550	—
2. Potential to Release:		
2a. Containment	10	—
2b. Net Precipitation	10	—
2c. Depth to Aquifer	5	—
2d. Travel Time	35	—
2e. Potential to Release [lines 2a(2b+2c+2d)]	500	—
3. Likelihood of Release (higher of lines 1 and 2e)	550	—
Waste Characteristics:		
4. Toxicity/Mobility	(a)	—
5. Hazardous Waste Quantity	(a)	—
6. Waste Characteristics	100	—
Targets:		
7. Nearest Well	50	—
8. Population:		
8a. Level I Concentrations	(b)	—
8b. Level II Concentrations	(b)	—
8c. Potential Contamination	(b)	—
8d. Population (lines 8a+8b+8c)	(b)	—
9. Resources	5	—
10. Wellhead Protection Area	20	—
11. Targets (lines 7+8d+9+10)	(b)	—
Ground Water Migration Score for an Aquifer:		
12. Aquifer Score [(lines 3x6x11)/82,500] [c]	100	—
Ground Water Migration Pathway Score:		
13. Pathway Score (S_{gw}), (highest value from line 12 for all aquifers evaluated) [c]	100	—

[a] Maximum value applies to waste characteristics category.
[b] Maximum value not applicable.
[c] Do not round to nearest integer.

3.0.1 *General considerations*

3.0.1.1 *Ground water target distance limit.* The target distance limit defines the maximum distance from the sources at the site over which targets are evaluated. Use a target distance limit of 4 miles for the ground water migration pathway, except when aquifer discontinuities apply (see section 3.0.1.2.2). Furthermore, consider any well with an observed release from a source at the site (see section 3.1.1) to lie within the target distance limit of the site, regardless of the well's distance from the sources at the site.

For sites that consist solely of a contaminated ground water plume with no identified source, begin measuring the 4-mile target distance limit at the center of the area of observed ground water contamination. Determine the area of observed ground water contamination based on available samples that meet the criteria for an observed release.

3.0.1.2 *Aquifer boundaries.* Combine multiple aquifers into a single hydrologic unit for scoring purposes if aquifer interconnections can be established for these aquifers. In contrast, restrict aquifer boundaries if aquifer discontinuities can be established.

3.0.1.2.1 *Aquifer interconnections.* Evaluate whether aquifer interconnections occur within 2 miles of the sources at the site. If they occur within this 2-mile distance, combine the aquifers having interconnections in scoring the site. In addition, if observed ground water contamination attributable to the sources at the site extends beyond 2 miles from the sources, use any locations within the limits of this observed ground water contamination in evaluating aquifer interconnections. If data are not adequate to establish aquifer interconnections, evaluate the aquifers as separate aquifers.

3.0.1.2.2 *Aquifer discontinuities.* Evaluate whether aquifer discontinuities occur within the 4-mile target distance limit. An aquifer discontinuity occurs for scoring purposes only when a geologic, topographic, or other structure or feature entirely transects an aquifer within the 4-mile target distance limit, thereby creating a continuous boundary to ground water flow within this limit. If two or more aquifers can be combined into a single hydrologic unit for scoring purposes, an aquifer discontinuity occurs only when the structure or feature entirely transects the boundaries of this single hydrologic unit.

When an aquifer discontinuity is established within the 4-mile target distance limit, exclude that portion of the aquifer beyond the discontinuity in evaluating the ground water migration pathway. However, if hazardous substances have migrated across an apparent discontinuity within the 4-mile target distance limit, do not consider this to be a discontinuity in scoring the site.

3.0.1.3 *Karst aquifer.* Give a karst aquifer that underlies any portion of the sources at the site special consideration in the evaluation of two potential to release factors (depth to aquifer in section 3.1.2.3 and travel time in section 3.1.2.4), one waste characteristics factor (mobility in section 3.2.1.2), and two targets factors (nearest well in section 3.3.1 and potential contamination in section 3.3.2.4).

3.1 *Likelihood of release.* For an aquifer, evaluate the likelihood of release factor category in terms of an observed release factor or a potential to release factor.

3.1.1 *Observed release.* Establish an observed release to an aquifer by demonstrating that the site has released a hazardous substance to the aquifer. Base this demonstration on either:

- Direct observation—a material that contains one or more hazardous substances has been deposited into or has been observed entering the aquifer.
- Chemical analysis—an analysis of ground water samples from the aquifer indicates that the concentration of hazardous substance(s) has increased significantly above the background concentration for the site (see section 2.3). Some portion of the significant increase must be attributable to the site to establish the observed release, except: when the source itself consists of a ground water plume with no identified source, no separate attribution is required.

If an observed release can be established for the aquifer, assign the aquifer an observed release factor value of 550, enter this value in Table 3-1, and proceed to section 3.1.3. If an observed release cannot be established for the aquifer, assign an observed release factor value of 0, enter this value in Table 3-1, and proceed to section 3.1.2.

3.1.2 *Potential to release.* Evaluate potential to release only if an observed release cannot be established for the aquifer. Evaluate potential to release based on four factors: containment, net precipitation, depth to aquifer, and travel time. For sources overlying karst terrain, give any karst aquifer that underlies any portion of the sources at the site special consideration in evaluating depth to aquifer and travel time, as specified in sections 3.1.2.3 and 3.1.2.4.

3.1.2.1 *Containment.* Assign a containment factor value from Table 3-2 to each source at the site. Select the highest containment factor value assigned to those sources with a source hazardous waste quantity value of 0.5 or more (see section

2.4.2.1.5). (Do not include this minimum size requirement in evaluating any other factor of this pathway.) Assign this highest value as the containment factor value for the aquifer being evaluated. Enter this value in Table 3-1.

If no source at the site meets the minimum size requirement, then select the highest value assigned to the sources at the site and assign it as the containment factor value for the aquifer being evaluated. Enter this value in Table 3-1.

3.1.2.2 *Net precipitation.* Assign a net precipitation factor value to the site. Figure 3-2 provides computed net precipitation factor values, based on site location. Where necessary, determine the net precipitation factor value as follows:

• Determine monthly precipitation and monthly evapotranspiration:
  - Use local measured monthly averages.
  - When local data are not available, use monthly averages from the nearest National Oceanographic and Atmospheric Administration weather station that is in a similar geographic setting.

TABLE 3-2.—CONTAINMENT FACTOR VALUES FOR GROUND WATER MIGRATION PATHWAY

Source	Assigned value
All Sources (Except Surface Impoundments, Land Treatment, Containers, and Tanks)	
Evidence of hazardous substance migration from source area (i.e., source area includes source and any associated containment structures).	10
No liner	10
No evidence of hazardous substance migration from source area, a liner, *and*:	
(a) None of the following present: (1) maintained engineered cover, or (2) functioning and maintained run-on control system and runoff management system, or (3) functioning leachate collection and removal system immediately above liner.	10
(b) Any one of the three items in (a) present	9
(c) Any two of the items in (a) present	7
(d) All three items in (a) present plus a functioning ground water monitoring system	5
(e) All items in (d) present, plus no bulk or non-containerized liquids nor materials containing free liquids deposited in source area.	3
No evidence of hazardous substance migration from source area, double liner with functioning leachate collection and removal system above and between liners, functioning ground water monitoring system, *and*:	
(f) Only one of the following deficiencies present in containment: (1) bulk or noncontainerized liquids or materials containing free liquids deposited in source area, or (2) no or nonfunctioning or nonmaintained run-on control system and runoff management system, or (3) no or nonmaintained engineered cover.	3
(g) None of the deficiencies in (f) present	0
Source area inside or under maintained intact structure that provides protection from precipitation so that neither runoff nor leachate is generated, liquids or materials containing free liquids not deposited in source area, and functioning and maintained run-on control present.	0
Surface Impoundment	
Evidence of hazardous substance migration from surface impoundment	10
No liner	10
Free-liquids present with either no diking, unsound diking, or diking that is not regularly inspected and maintained	10
No evidence of hazardous substance migration from surface impoundment, free liquids present, sound diking that is regularly inspected and maintained, adequate freeboard, *and*:	
(a) Liner	9
(b) Liner with functioning leachate collection and removal system below liner, and functioning ground water monitoring system.	5
(c) Double liner with functioning leachate collection and removal system between liners, and functioning ground water monitoring system.	3
No evidence of hazardous substance migration from surface impoundment and all free liquids eliminated at closure (either by removal of liquids or solidification of remaining wastes and waste residues).	Evaluate using All sources criteria (with no bulk or free liquid deposited).
Land Treatment	
Evidence of hazardous substance migration from land treatment zone	10
No functioning, maintained, run-on control and runoff management system	10
No evidence of hazardous substance migration from land treatment zone *and*:	
(a) Functioning and maintained run-on control and runoff management system	7
(b) Functioning and maintained run-on control and runoff management system, and vegetative cover established over entire land treatment area.	5
(c) Land treatment area maintained in compliance with 40 CFR 264.280	0

TABLE 3-2.—CONTAINMENT FACTOR VALUES FOR GROUND WATER MIGRATION PATHWAY—Continued

Source	Assigned value
Containers	
All containers buried	Evaluate using All sources criteria.
Evidence of hazardous substance migration from container area (i.e., container area includes containers and any associated containment structures).	10
No liner (or no essentially impervious base) under container area	10
No diking (or no similar structure) surrounding container area	10
Diking surrounding container area unsound or not regularly inspected and maintained	10
No evidence of hazardous substance migration from container area, container area surrounded by sound diking that is regularly inspected and maintained, and:	
(a) Liner (or essentially impervious base) under container area	9
(b) Essentially impervious base under container area with liquids collection and removal system	7
(c) Containment system includes essentially impervious base, liquids collection system, sufficient capacity to contain 10 percent of volume of all containers, and functioning and maintained run-on control; plus functioning ground water monitoring system, and spilled or leaked hazardous substances and accumulated precipitation removed in timely manner to prevent overflow of collection system, at least weekly inspection of containers, hazardous substances in leaking or deteriorating containers transferred to containers in good condition, and containers sealed except when waste is added or removed.	5
(d) Free liquids present, containment system has sufficient capacity to hold total volume of all containers and to provide adequate freeboard, single liner under container area with functioning leachate collection and removal system below liner, and functioning ground water monitoring system.	5
(e) Same as (d) except: double liner under container area with functioning leachate collection and removal system between liners.	3
Containers inside or under maintained intact structure that provides protection from precipitation so that neither runoff nor leachate would be generated from any unsealed or ruptured containers, liquids or materials containing free liquids not deposited in any container, and functioning and maintained run-off control present.	0
No evidence of hazardous substance migration from container area, containers leaking, and all free liquids eliminated at closure (either by removal of liquid or solidification of remaining wastes and waste residues).	Evaluate using All sources criteria (with no bulk or free liquid deposited).
Tank	
Below-ground tank	Evaluate using All sources criteria.
Evidence of hazardous substance migration from tank area (i.e., tank area includes tank, ancillary equipment such as piping, and any associated containment structures).	10
Tank and ancillary equipment not provided with secondary containment (e.g., liner under tank area, vault system, double wall).	10
No diking (or no similar structure) surrounding tank and ancillary equipment	10
Diking surrounding tank and ancillary equipment unsound or not regularly inspected and maintained	10
No evidence of hazardous substance migration from tank area, tank and ancillary equipment surrounded by sound diking that is regularly inspected and maintained, and:	
(a) Tank and ancillary equipment provided with secondary containment	9
(b) Tank and ancillary equipment provided with secondary containment with leak detection and collection system.	7
(c) Tank and ancillary equipment provided with secondary containment system that detects and collects spilled or leaked hazardous substances and accumulated precipitation and has sufficient capacity to contain 110 percent of volume of largest tank within containment area, spilled or leaked hazardous substances and accumulated precipitation removed in timely manner, at least weekly inspection of tank and secondary containment system, all leaking or unfit-for-use tank systems promptly responded to, and functioning ground water monitoring system.	5
(d) Containment system has sufficient capacity to hold volume of all tanks within tank containment area and to provide adequate freeboard, single liner under that containment area with functioning leachate collection and removal system below liner, and functioning ground water monitoring system.	5
(e) Same as (d) except: double liner under tank containment area with functioning leachate collection and removal system between liners.	3
Tank is above ground, and inside or under maintained intact structure that provides protection from precipitation so that neither runoff nor leachate would be generated from any material released from tank, liquids or materials containing free liquids not deposited in any tank, and functioning and maintained run-on control present.	0

BILLING CODE 6560-50-M

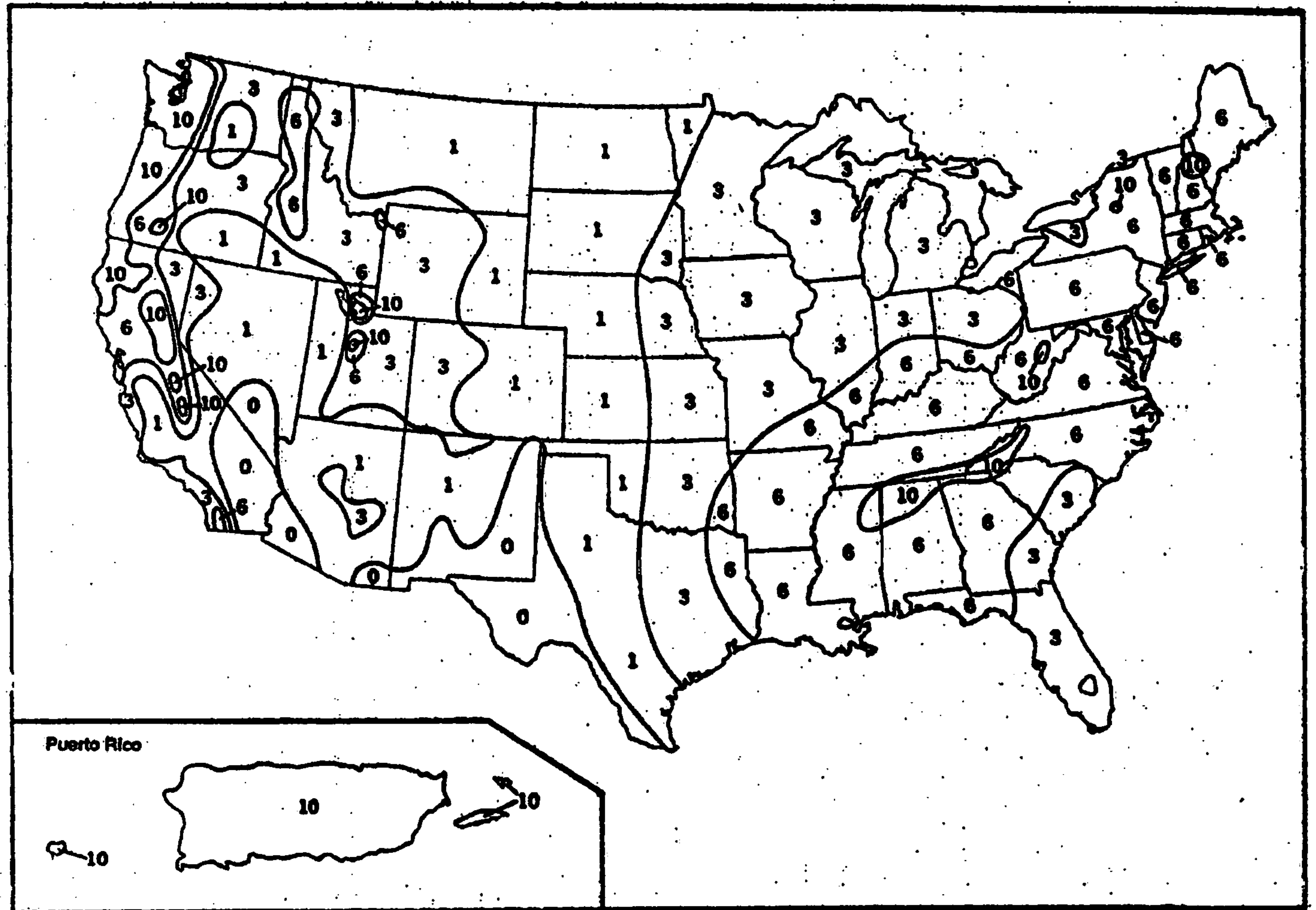
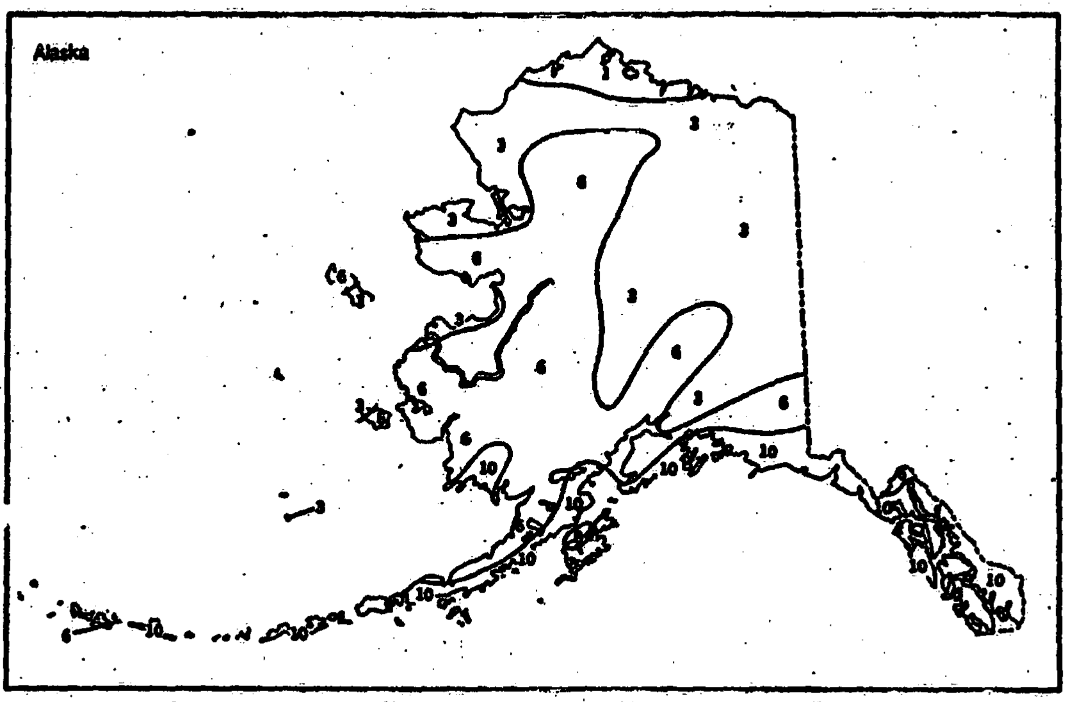


FIGURE 3-2
NET PRECIPITATION FACTOR VALUES



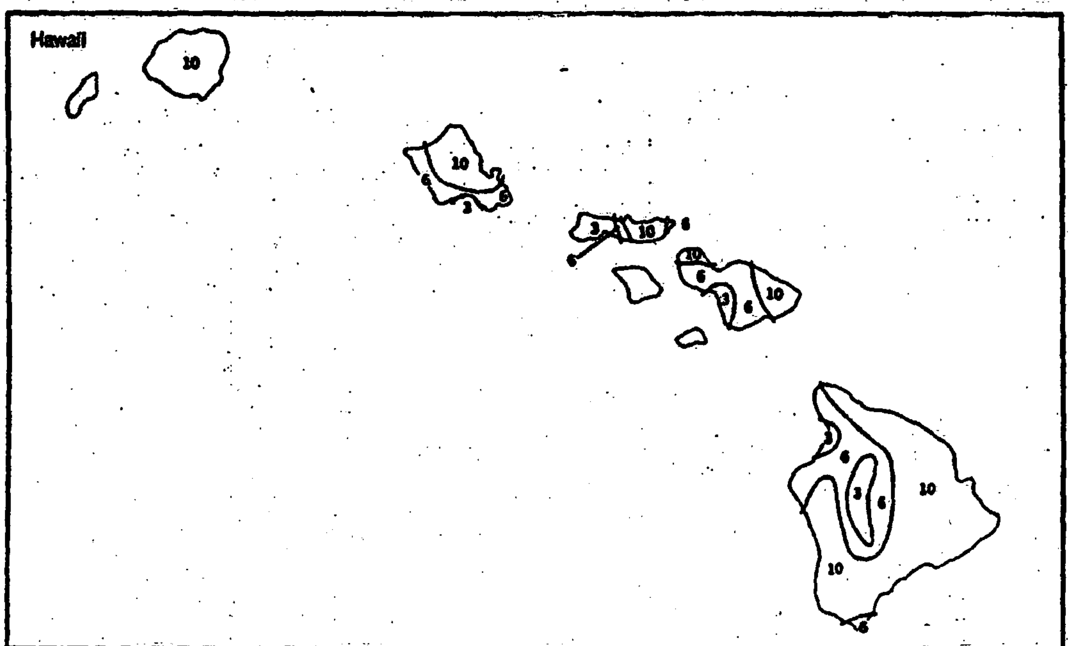


FIGURE 3-2
NET PRECIPITATION FACTOR VALUES
(CONCLUDED)

BILLING CODE 6560-50-C

–When measured monthly evapotranspiration is not available, calculate monthly potential evapotranspiration (E_i) as follows:

$E_i = 0.6 F_i (10 T_i/I)^a$

where:

E_i=Monthly potential evapotranspiration (inches) for month i.

F_i=Monthly latitude adjusting value for month i.

T_i=Mean monthly temperature (°C) for month i.

$$I = \sum_{i=1}^{12} (T_i/5)^{1.514}$$

$$a = 6.75\times10^{-7} I^3 - 7.71\times10^{-5} I^2 + 1.79\times10^{-2} I + 0.49239$$

Select the latitude adjusting value for each month from Table 3-3. For latitudes lower than 50° North or 20° South, determine the monthly latitude adjusting value by interpolation.

• Calculate monthly net precipitation by subtracting monthly evapotranspiration (or monthly potential evapotranspiration) from monthly precipitation. If evapotranspiration (or potential evapotranspiration) exceeds precipitation for a month, assign that month a net precipitation value of 0.

• Calculate the annual net precipitation by summing the monthly net precipitation values.

• Based on the annual net precipitation, assign a net precipitation factor value from Table 3-4.

Enter the value assigned from Figure 3-2 or from Table 3-4, as appropriate, in Table 3-1.

TABLE 3-3.—MONTHLY LATITUDE ADJUSTING VALUES[a]

Latitude[b] (degrees)	Month											
	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.
≥50 N	0.74	0.78	1.02	1.15	1.33	1.36	1.37	1.25	1.06	0.92	0.76	0.70
45 N	0.80	0.81	1.02	1.13	1.28	1.29	1.31	1.21	1.04	0.94	0.79	0.75
40 N	0.84	0.83	1.03	1.11	1.24	1.25	1.27	1.18	1.04	0.96	0.83	0.81
35 N	0.87	0.85	1.03	1.09	1.21	1.21	1.23	1.16	1.03	0.97	0.86	0.85
30 N	0.90	0.87	1.03	1.08	1.18	1.17	1.20	1.14	1.03	0.98	0.89	0.88
20 N	0.95	0.90	1.03	1.05	1.13	1.11	1.14	1.11	1.02	1.00	0.93	0.94
10 N	1.00	0.91	1.03	1.03	1.08	1.06	1.08	1.07	1.02	1.02	0.98	0.99
0	1.04	0.94	1.04	1.01	1.04	1.01	1.04	1.04	1.01	1.04	1.01	1.04
10 S	1.08	0.97	1.05	0.99	1.00	0.96	1.00	1.02	1.00	1.06	1.05	1.09
20 S	1.14	0.99	1.05	0.97	0.96	0.91	0.95	0.99	1.00	1.08	1.09	1.15

[a] Do not round to nearest integer.
[b] For unlisted latitudes lower than 50° North or 20° South, determine the latitude adjusting value by interpolation.

TABLE 3-4.—NET PRECIPITATION FACTOR VALUES

Net precipitation (inches)	Assigned value
0	0
Greater than 0 to 5	1
Greater than 5 to 15	3
Greater than 15 to 30	6
Greater than 30	10

3.1.2.3 *Depth to aquifer.* Evaluate depth to aquifer by determining the depth from the lowest known point of hazardous substances at a site to the top of the aquifer being evaluated, considering all layers in that interval. Measure the depth to an aquifer as the distance from the surface to the top of the aquifer minus the distance from the surface to the lowest known point of hazardous substances eligible to be evaluated for that aquifer. In evaluating depth to aquifer in karst terrain, assign a thickness of 0 feet to a karst aquifer that underlies any portion of the sources at the site. Based on the calculated depth, assign a value from Table 3-5 to the depth to aquifer factor.

Determine the depth to aquifer only at locations within 2 miles of the sources at the site, except: if observed ground water contamination attributable to sources at the site extends more than 2 miles beyond these sources, use any location within the limits of this observed ground water contamination when evaluating the depth to aquifer factor for any aquifer that does not have an observed release. If the necessary geologic information is available at multiple locations, calculate the depth to aquifer at each location. Use the location having the smallest depth to assign the factor value. Enter this value in Table 3-1.

TABLE 3-5.—DEPTH TO AQUIFER FACTOR VALUES

Depth to aquifer[a] (feet)	Assigned value
Less than or equal to 25	5
Greater than 25 to 250	3
Greater than 250	1

[a] Use depth of all layers between the hazardous substances and aquifer. Assign a thickness of 0 feet to any karst aquifer that underlies any portion of the sources at the site.

3.1.2.4 *Travel time.* Evaluate the travel time factor based on the geologic materials in the interval between the lowest known point of hazardous substances at the site and the top of the aquifer being evaluated. Assign a value to the travel time factor as follows:

• If the depth to aquifer (see section 3.1.2.3) is 10 feet or less, assign a value of 35.

• If, for the interval being evaluated, all layers that underlie a portion of the sources at the site are karst, assign a value of 35.

• Otherwise:

–Select the lowest hydraulic conductivity layer(s) from within the above interval. Consider only layers at least 3 feet thick. However, do not consider layers or portions of layers within the first 10 feet of the depth to the aquifer.

–Determine hydraulic conductivities for individual layers from Table 3-6 or from in-situ or laboratory tests. Use representative, measured, hydraulic conductivity values whenever available.

–If more than one layer has the same lowest hydraulic conductivity, include all such layers and sum their thicknesses. Assign a thickness of 0 feet to a karst layer that underlies any portion of the sources at the site.

–Assign a value from Table 3-7 to the travel time factor, based on the thickness and hydraulic conductivity of the lowest hydraulic conductivity layer(s).

TABLE 3-6.—HYDRAULIC CONDUCTIVITY OF GEOLOGIC MATERIALS

Type of material	Assigned hydraulic conductivity[a] (cm/sec)
Clay; low permeability till (compact unfractured till); shale; unfractured metamorphic and igneous rocks	10^{-8}
Silt; loesses; silty clays; sediments that are predominantly silts; moderately permeable till (fine-grained, unconsolidated till, or compact till with some fractures); low permeability limestones and dolomites (no karst); low permeability sandstone; low permeability fractured igneous and metamorphic rocks	10^{-6}
Sands; sandy silts; sediments that are predominantly sand; highly permeable till (coarse-grained, unconsolidated or compact and highly fractured); peat; moderately permeable limestones and dolomites (no karst); moderately permeable sandstone; moderately permeable fractured igneous and metamorphic rocks	10^{-4}
Gravel; clean sand; highly permeable fractured igneous and metamorphic rocks; permeable basalt; karst limestones and dolomites	10^{-2}

[a] Do not round to nearest integer.

TABLE 3-7.—TRAVEL TIME FACTOR VALUES[a]

Hydraulic conductivity (cm/sec)	Thickness of lowest hydraulic conductivity layer(s)[b] (feet)			
	Greater than 3 to 5	Greater than 5 to 100	Greater than 100 to 500	Greater than 500
Greater than or equal to 10^{-3}	35	35	35	25
Less than 10^{-3} to 10^{-5}	35	25	15	15
Less than 10^{-5} to 10^{-7}	15	15	5	5
Less than 10^{-7}	5	5	1	1

[a] If depth to aquifer is 10 feet or less or if, for the interval being evaluated, all layers that underlie a portion of the sources at the site are karst, assign a value of 35.

[b] Consider only layers at least 3 feet thick. Do not consider layers or portions of layers within the first 10 feet of the depth to the aquifer.

Determine travel time only at locations within 2 miles of the sources at the site, except: if observed ground water contamination attributable to sources at the site extends more than 2 miles beyond these sources, use any location within the limits of this observed ground water contamination when evaluating the travel time factor for any aquifer that does not have an observed release. If the necessary subsurface geologic information is available at multiple locations, evaluate the travel time factor at each location. Use the location having the highest travel time factor value to assign the factor value for the aquifer. Enter this value in Table 3-1.

3.1.2.5 *Calculation of potential to release factor value.* Sum the factor values for net precipitation, depth to aquifer, and travel time, and multiply this sum by the factor value for containment. Assign this product as the potential to release factor value for the aquifer. Enter this value in Table 3-1.

3.1.3 *Calculation of likelihood of release factor category value.* If an observed release is established for an aquifer, assign the observed release factor value of 550 as the likelihood of release factor category value for that aquifer. Otherwise, assign the potential to release factor value for that aquifer as the likelihood of release value. Enter the value assigned in Table 3-1.

3.2 *Waste characteristics.* Evaluate the waste characteristics factor category for an aquifer based on two factors: toxicity/mobility and hazardous waste quantity. Evaluate only those hazardous substances available to migrate from the sources at the site to ground water. Such hazardous substances include:

- Hazardous substances that meet the criteria for an observed release to ground water.
- All hazardous substances associated with a source that has a ground water containment factor value greater than 0 (see sections 2.2.2, 2.2.3, and 3.1.2.1).

3.2.1 *Toxicity/mobility.* For each hazardous substance, assign a toxicity factor value, a mobility factor value, and a combined toxicity/mobility factor value as specified in the following sections. Select the toxicity/mobility factor value for the aquifer being evaluated as specified in section 3.2.1.3.

3.2.1.1 *Toxicity.* Assign a toxicity factor value to each hazardous substance as specified in Section 2.4.1.1.

3.2.1.2 *Mobility.* Assign a mobility factor value to each hazardous substance for the aquifer being evaluated as follows:

- For any hazardous substance that meets the criteria for an observed release by chemical analysis to one or more aquifers underlying the sources at the site, regardless of the aquifer being evaluated, assign a mobility factor value of 1.
- For any hazardous substance that does not meet the criteria for an observed release by chemical analysis to at least one of the aquifers, assign that hazardous substance a mobility factor value from Table 3-8 for the aquifer being evaluated, based on its water solubility and distribution coefficient (K_d).
- If the hazardous substance cannot be assigned a mobility factor value because data on its water solubility or distribution coefficient are not available, use other hazardous substances for which information is available in evaluating the pathway.

TABLE 3-8.—GROUND WATER MOBILITY FACTOR VALUES[a]

Water solubility (mg/l)	Distribution coefficient (K_d) (ml/g)			
	Karst[c]	≤10	>10 to 1,000	>1,000
Present as liquid[b]	1	1	0.01	0.0001
Greater than 100	1	1	0.01	0.0001
Greater than 1 to 100	0.2	0.2	0.002	2×10^{-5}
Greater than 0.01 to 1	0.002	0.002	2×10^{-5}	2×10^{-7}
Less than or equal to 0.01	2×10^{-5}	2×10^{-5}	2×10^{-7}	2×10^{-9}

[a] Do not round to nearest integer.

[b] Use if the hazardous substance is present or deposited as a liquid.

[c] Use if the entire interval from the source to the aquifer being evaluated is karst.

• If none of the hazardous substances eligible to be evaluated can be assigned a mobility factor value, use a default value of 0.002 as the mobility factor value for all these hazardous substances.

Determine the water solubility to be used in Table 3-8 for the hazardous substance as follows (use this same water solubility for all aquifers):

• For any hazardous substance that does not meet the criteria for an observed release by chemical analysis, if the hazardous substance is present or deposited as a liquid, use the water solubility category "Present as Liquid" in Table 3-8 to assign the mobility factor value to that hazardous substance.

• Otherwise:

—For any hazardous substance that is a metal (or metalloid) and that does not meet the criteria for an observed release by chemical analysis, establish a water solubility for the hazardous substance as follows:

——Determine the overall range of water solubilities for compounds of this hazardous substance (consider all compounds for which adequate water solubility information is available, not just compounds identified as present at the site).

——Calculate the geometric mean of the highest and the lowest water solubility in this range.

——Use this geometric mean as the water solubility in assigning the hazardous substance a mobility factor value from Table 3-8.

—For any other hazardous substance (either organic or inorganic) that does not meet the criteria for an observed release by chemical analysis, use the water solubility of that hazardous substance to assign a mobility factor value from Table 3-8 to the hazardous substance.

For the aquifer being evaluated, determine the distribution coefficient to be used in Table 3-8 for the hazardous substance as follows:

• For any hazardous substance that does not meet the criteria for an observed release by chemical analysis, if the entire interval from a source at the site to the aquifer being evaluated is karst, use the distribution coefficient category "Karst" in Table 3-8 in assigning the mobility factor value for that hazardous substance for that aquifer.

• Otherwise:

—For any hazardous substance that is a metal (or metalloid) and that does not meet the criteria for an observed release by chemical analysis, use the distribution coefficient for the metal or (metalloid) to assign a mobility factor value from Table 3-8 for that hazardous substance.

—For any other inorganic hazardous substance that does not meet the criteria for an observed release by chemical analysis, use the distribution coefficient for that inorganic hazardous substance, if available, to assign a mobility factor value from Table 3-8. If the distribution coefficient is not available, use a default value of "less than 10" as the distribution coefficient, except for asbestos use a default value of "greater than 1,000" as the distribution coefficient.

—For any hazardous substance that is organic and that does not meet the criteria for an observed release by chemical analysis, establish a distribution coefficient for that hazardous substance as follows:

——Estimate the K_d range for the hazardous substance using the following equation:

$K_d=(K_{oc})(f_s)$

where:

K_{oc}=Soil-water partition coefficient for organic carbon for the hazardous substance.

f_s=Sorbent content (fraction of clays plus organic carbon) in the subsurface.

——Use f_s values of 0.03 and 0.77 in the above equation to establish the upper and lower values of the K_d range for the hazardous substance.

——Calculate the geometric mean of the upper and lower K_d range values. Use this geometric mean as the distribution coefficient in assigning the hazardous substance a mobility factor value from Table 3-8.

3.2.1.3 *Calculation of toxicity/mobility factor value.* Assign each hazardous substance a toxicity/mobility factor value from Table 3-9, based on the values assigned to the hazardous substance for the toxicity and mobility factors. Use the hazardous substance with the highest toxicity/mobility factor value for the aquifer being evaluated to assign the value to the toxicity/mobility factor for that aquifer. Enter this value in Table 3-1.

TABLE 3-9.—TOXICITY/MOBILITY FACTOR VALUES [a]

Mobility factor value	Toxicity factor value					
	10,000	1,000	100	10	1	0
1.0	10,000	1,000	100	10	1	0
0.2	2,000	200	20	2	0.2	0
0.01	100	10	1	0.1	0.01	0
0.002	20	2	0.2	0.02	0.002	0
0.0001	1	0.1	0.01	0.001	1×10^{-4}	0
2×10^{-5}	0.2	0.02	0.002	2×10^{-4}	2×10^{-5}	0
2×10^{-7}	0.002	2×10^{-4}	2×10^{-5}	2×10^{-6}	2×10^{-7}	0
2×10^{-9}	2×10^{-5}	2×10^{-6}	2×10^{-7}	2×10^{-8}	2×10^{-9}	0

[a] Do not round to nearest integer.

3.2.2 *Hazardous waste quantity.* Assign a hazardous waste quantity factor value for the ground water pathway (or aquifer) as specified in section 2.4.2. Enter this value in Table 3-1.

3.2.3 *Calculation of waste characteristics factor category value.* Multiply the toxicity/mobility and hazardous waste quantity factor values, subject to a maximum product of 1×10^8. Based on this product, assign a value from Table 2-7 (section 2.4.3.1) to the waste characteristics factor category. Enter this value in Table 3-1.

3.3 *Targets.* Evaluate the targets factor category for an aquifer based on four factors: nearest well, population, resources, and Wellhead Protection Area. Evaluate these four factors based on targets within the target distance limit specified in section 3.0.1.1 and the aquifer boundaries specified in section 3.0.1.2. Determine the targets to be included in evaluating these factors for an aquifer as specified in section 3.0.

3.3.1 *Nearest well.* In evaluating the nearest well factor, include both the drinking water wells drawing from the aquifer being evaluated and those drawing from overlying aquifers as specified in section 3.0. Include standby wells in evaluating this factor only if they are used for drinking water supply at least once every year.

If there is an observed release by direct observation for a drinking water well within the target distance limit, assign Level II concentrations to that well. However, if one or more samples meet the criteria for an observed release for that well, determine if that well is subject to Level I or Level II concentrations as specified in sections 2.5.1 and 2.5.2. Use the health-based benchmarks from Table 3-10 in determining the level of contamination.

Assign a value for the nearest well factor as follows:

• If one or more drinking water wells is subject to Level I concentrations, assign a value of 50.

• If not, but if one or more drinking water wells is subject to Level II concentrations, assign a value of 45.

• If none of the drinking water wells is subject to Level I or Level II concentrations, assign a value as follows:

–If one of the target aquifers is a karst aquifer that underlies any portion of the sources at the site and any well draws drinking water from this karst aquifer within the target distance limit, assign a value of 20.

–If not, determine the shortest distance to any drinking water well, as measured from any source at the site with a ground water containment factor value greater than 0. Select a value from Table 3-11 based on this distance. Assign it as the value for the nearest well factor.

Enter the value assigned to the nearest well factor in Table 3-1.

TABLE 3-10.—HEALTH-BASED BENCHMARKS FOR HAZARDOUS SUBSTANCES IN DRINKING WATER

• Concentration corresponding to Maximum Contaminant Level (MCL).
• Concentration corresponding to a nonzero Maximum Contaminant Level Goal (MCLG).
• Screening concentration for cancer corresponding to that concentration that corresponds to the 10^{-6} individual cancer risk for oral exposures.
• Screening concentration for noncancer toxicological responses corresponding to the Reference Dose (RfD) for oral exposures.

TABLE 3-11.—NEAREST WELL FACTOR VALUES

Distance from source (miles)	Assigned value
Level I concentrations[a]	50
Level II concentrations[a]	45
0 to ¼	20
Greater than ¼ to ½	18
Greater than ½ to 1	9
Greater than 1 to 2	5
Greater than 2 to 3	3
Greater than 3 to 4	2
Greater than 4	0

[a] Distance does not apply.

3.3.2 *Population.* In evaluating the population factor, include those persons served by drinking water wells within the target distance limit specified in section 3.0.1.1. For the aquifer being evaluated, count those persons served by wells in that aquifer and those persons served by wells in overlying aquifers as specified in section 3.0. Include residents, students, and workers who regularly use the water. Exclude transient populations such as customers and travelers passing through the area. Evaluate the population based on the location of the water supply wells, not on the location of residences, work places, etc. When a standby well is maintained on a regular basis so that water can be withdrawn, include it in evaluating the population factor.

In estimating residential population, when the estimate is based on the number of residences, multiply each residence by the average number of persons per residence for the county in which the residence is located.

In determining the population served by a well, if the water from the well is blended with other water (for example, water from other ground water wells or surface water intakes), apportion the total population regularly served by the blended system to the well based on the well's relative contribution to the total blended system. In estimating the well's relative contribution, assume each well and intake contributes equally and apportion the population accordingly, except: if the relative contribution of any one well or intake exceeds 40 percent based on average annual pumpage or capacity, estimate the relative contribution of the wells and intakes considering the following data, if available:

• Average annual pumpage from the ground water wells and surface water intakes in the blended system.

• Capacities of the wells and intakes in the blended system.

For systems with standby ground water wells or standby surface water intakes, apportion the total population regularly served by the blended system as described above, except:

• Exclude standby surface water intakes in apportioning the population.

• When using pumpage data for a standby ground water well, use average pumpage for the period during which the standby well is used rather than average annual pumpage.

• For that portion of the total population that could be apportioned to a standby ground water well, assign that portion of the population either to that standby well or to the other ground water well(s) and surface water intake(s) that serve that population; do not assign that portion of the population both to the standby well and to the other well(s) and intake(s) in the blended system. Use the apportioning that results in the highest population factor value. (Either include all standby well(s) or exclude some or all of the standby well(s) as appropriate to obtain this highest value.) Note that the specific standby well(s) included or excluded and, thus, the specific apportioning may vary in evaluating different aquifers and in evaluating the surface water pathway.

3.3.2.1 *Level of contamination.* Evaluate the population served by water from a point of withdrawal based on the level of contamination for that point of withdrawal. Use the applicable factor: Level I concentrations, Level II concentrations, or potential contamination.

If no samples meet the criteria for an observed release for a point of withdrawal and there is no observed release by direct observation for that point of withdrawal, evaluate that point of withdrawal using the potential contamination factor in section 3.3.2.4. If there is an observed release by direct observation, use Level II concentrations for that point of withdrawal. However, if one or more samples meet the criteria for an observed release for the point of withdrawal, determine which factor (Level I or Level II concentrations) applies to that point of withdrawal as specified in sections 2.5.1 and 2.5.2. Use the health-based benchmarks from Table 3-10 in determining the level of contamination. Evaluate the point of withdrawal using the Level I concentrations factor in section 3.3.2.2 or the Level II concentrations factor in section 3.3.2.3, as appropriate.

For the potential contamination factor, use population ranges in evaluating the factor as specified in section 3.3.2.4. For the Level I and Level II concentrations factors, use the population estimate, not population ranges, in evaluating both factors.

3.3.2.2 *Level I concentrations.* Sum the number of people served by drinking water from points of withdrawal subject to Level I concentrations. Multiply this sum by 10. Assign this product as the value for this factor. Enter this value in Table 3-1.

3.3.2.3 *Level II concentrations.* Sum the number of people served by drinking water from points of withdrawal subject to Level II concentrations. Do not include those people already counted under the Level I concentrations factor. Assign this sum as the value for this factor. Enter this value in Table 3-1.

3.3.2.4 *Potential contamination.* Determine the number of people served by drinking water from points of withdrawal subject to potential contamination. Do not include those people already counted under the Level I and Level II concentrations factors.

Assign distance-weighted population values from Table 3-12 to this population as follows:

• Use the "Karst" portion of Table 3-12 to assign values only for that portion of the population served by points of withdrawal that draw drinking water from a karst aquifer that underlies any portion of the sources at the site.

–For this portion of the population, determine the number of people included within each "Karst" distance category in Table 3-12.

TABLE 3-12.—DISTANCE-WEIGHTED POPULATION VALUES FOR POTENTIAL CONTAMINATION FACTOR FOR GROUND WATER MIGRATION PATHWAY[a]

Distance category (miles)	Number of people within the distance category												
	0	1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,000	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	1,000,001 to 3,000,000
Other Than Karst[b]:													
0 to ¼	0	4	17	53	164	522	1,633	5,214	16,325	52,137	163,246	521,360	1,632,455
Greater than ¼ to ½	0	2	11	33	102	324	1,013	3,233	10,122	32,325	101,213	323,243	1,012,122
Greater than ½ to 1	0	1	5	17	52	167	523	1,669	5,224	16,684	52,239	166,835	522,385
Greater than 1 to 2	0	0.7	3	10	30	94	294	939	2,939	9,385	29,384	93,845	293,842
Greater than 2 to 3	0	0.5	2	7	21	68	212	678	2,122	6,778	21,222	67,777	212,219
Greater than 3 to 4	0	0.3	1	4	13	42	131	417	1,306	4,171	13,060	41,709	130,596
Karst[c]:													
0 to ¼	0	4	17	53	164	522	1,633	5,214	16,325	52,137	163,246	521,360	1,632,455
Greater than ¼ to ½	0	2	11	33	102	324	1,013	3,233	10,122	32,325	101,213	323,243	1,012,122
Greater than ½ to 1	0	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227
Greater than 1 to 2	0	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227
Greater than 2 to 3	0	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227
Greater than 3 to 4	0	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227

[a] Round the number of people present within a distance category to nearest integer. Do not round the assigned distance-weighted population value to nearest integer.
[b] Use for all aquifers, except karst aquifers underlying any portion of the sources at the site.
[c] Use only for karst aquifers underlying any portion of the sources at the site.

—Assign a distance-weighted population value for each distance category based on the number of people included within the distance category.

• Use the "Other Than Karst" portion of Table 3-12 for the remainder of the population served by points of withdrawal subject to potential contamination:

—For this portion of the population, determine the number of people included within each "Other Than Karst" distance category in Table 3-12.
—Assign a distance-weighted population value for each distance category based on the number of people included within the distance category.

Calculate the value for the potential contamination factor (PC) as follows:

$$PC = \frac{1}{10} \sum_{i=1}^{n} (W_i + K_i)$$

where:

W_i=Distance-weighted population from "Other Than Karst" portion of Table 3-12 for distance category i.
K_i=Distance-weighted population from "Karst" portion of Table 3-12 for distance category i.
n=Number of distance categories.

If PC is less than 1, do not round it to the nearest integer; if PC is 1 or more, round to the nearest integer. Enter this value in Table 3-1.

3.3.2.5 *Calculation of population factor value.* Sum the factor values for Level I concentrations, Level II concentrations, and potential contamination. Do not round this sum to the nearest integer. Assign this sum as the population factor value for the aquifer. Enter this value in Table 3-1.

3.3.3 *Resources.* To evaluate the resources factor, select the highest value specified below that applies for the aquifer being evaluated. Assign this value as the resources factor value for the aquifer. Enter this value in Table 3-1.

Assign a resources value of 5 if water drawn from any target well for the aquifer being evaluated or overlying aquifers (as specified in section 3.0) is used for one or more of the following purposes:

• Irrigation (5-acre minimum) of commercial food crops or commercial forage crops.
• Watering of commercial livestock.
• Ingredient in commercial food preparation.
• Supply for commercial aquaculture.
• Supply for a major or designated water recreation area, excluding drinking water use.

Assign a resources value of 5 if no drinking water wells are within the target distance limit, but the water in the aquifer being evaluated or any overlying aquifers (as specified in section 3.0) is usable for drinking water purposes.

Assign a resources value of 0 if none of the above applies.

3.3.4 *Wellhead Protection Area.* Evaluate the Wellhead Protection Area factor based on Wellhead Protection Areas designated according to section 1428 of the Safe Drinking Water Act, as amended. Consider only those Wellhead Protection Areas applicable to the aquifer being evaluated or overlying aquifers (as specified in section 3.0). Select the highest value below that applies. Assign it as the value for the Wellhead Protection Area factor for the aquifer being evaluated. Enter this value in Table 3-1.

Assign a value of 20 if either of the following criteria applies for the aquifer being evaluated or overlying aquifers:

• A source with a ground water containment factor value greater than 0 lies, either partially or fully, within or above the designated Wellhead Protection Area.
• Observed ground water contamination attributable to the sources at the site lies, either partially or fully, within the designated Wellhead Protection Area.

If neither criterion applies, assign a value of 5, if, within the target distance limit, there is a designated Wellhead Protection Area applicable to the aquifer being evaluated or overlying aquifers.

Assign a value of 0 if none of the above applies.

3.3.5 *Calculation of targets factor category value.* Sum the factor values for nearest well, population, resources, and Wellhead Protection Area. Do not round this sum to the nearest integer. Use this sum as the targets factor category value for the aquifer. Enter this value in Table 3-1.

3.4 *Ground water migration score for an aquifer.* For the aquifer being evaluated, multiply the factor category values for likelihood of release, waste characteristics, and targets, and round the product to the nearest integer. Then divide by 82,500. Assign the resulting value, subject to a maximum value of 100, as the ground water migration pathway score for the aquifer. Enter this score in Table 3-1.

3.5 *Calculation of ground water migration pathway score.* Calculate a ground water migration score for each aquifer underlying the sources at the site, as appropriate. Assign the highest ground water migration score for an aquifer as the ground water migration pathway score (S_{gw}) for the site. Enter this score in Table 3-1.

4.0 *Surface Water Migration Pathway.*

4.0.1 *Migration components.* Evaluate the surface water migration pathway based on two migration components:

• Overland/flood migration to surface water (see section 4.1).
• Ground water to surface water migration (see section 4.2).

Evaluate each component based on the same three threats: drinking water threat, human food chain threat, and environmental threat.

Score one or both components, considering their relative importance. If only one component is scored, assign its score as the surface water migration pathway score. If both components are scored, select the higher of the two scores and assign it as the surface water migration pathway score.

4.0.2 *Surface water categories.* For HRS purposes, classify surface water into four categories: rivers, lakes, oceans, and coastal tidal waters.

Rivers include:

• Perennially flowing waters from point of origin to the ocean or to coastal tidal waters, whichever comes first, and wetlands contiguous to these flowing waters.

• Aboveground portions of disappearing rivers.

• Man-made ditches only insofar as they perennially flow into other surface water.

• Intermittently flowing waters and contiguous intermittently flowing ditches only in arid or semiarid areas with less than 20 inches of mean annual precipitation.

Lakes include:

• Natural and man-made lakes (including impoundments) that lie along rivers, but excluding the Great Lakes.

• Isolated, but perennial, lakes, ponds, and wetlands.

• Static water channels or oxbow lakes contiguous to rivers.

• Small rivers, without diking, that merge into surrounding perennially inundated wetlands.

• Wetlands contiguous to water bodies defined here as lakes.

Ocean and ocean-like water bodies include:

• Ocean areas seaward from the baseline of the Territorial Sea. (This baseline represents the generalized coastline of the United States. It is parallel to the seaward limit of the Territorial Sea and other maritime limits such as the inner boundary of Federal fisheries jurisdiction and the limit of States jurisdiction under the Submerged Lands Act, as amended.)

• The Great Lakes.

• Wetlands contiguous to the Great Lakes.

Coastal tidal waters include:

• Embayments, harbors, sounds, estuaries, back bays, lagoons, wetlands, etc. seaward from mouths of rivers and landward from the baseline of the Territorial Sea.

4.1 *Overland/flood migration component.* Use the overland/flood migration component to evaluate surface water threats that result from overland migration of hazardous substances from a source at the site to surface water. Evaluate three types of threats for this component: drinking water threat, human food chain threat, and environmental threat.

4.1.1 *General considerations.*

4.1.1.1 *Definition of hazardous substance migration path for overland/flood migration component.* The hazardous substance migration path includes both the overland segment and the in-water segment that hazardous substances would take as they migrate away from sources at the site:

• Begin the overland segment at a source and proceed downgradient to the probable point of entry to surface water.

• Begin the in-water segment at this probable point of entry.

–For rivers, continue the in-water segment in the direction of flow (including any tidal flows) for the distance established by the target distance limit (see section 4.1.1.2).

–For lakes, oceans, coastal tidal waters, or Great Lakes, do not consider flow direction. Instead apply the target distance limit as an arc.

–If the in-water segment includes both rivers and lakes (or oceans, coastal tidal waters, or Great Lakes), apply the target distance limit to their combined in-water segments.

For sites that consist of contaminated sediments with no identified source, the hazardous substance migration path consists solely of the in-water segment specified in section 4.1.1.2.

Consider a site to be in two or more watersheds for this component if two or more hazardous substance migration paths from the sources at the site do not reach a common point within the target distance limit. If the site is in more than one watershed, define a separate hazardous substance migration path for each watershed. Evaluate the overland/flood migration component for each watershed separately as specified in section 4.1.1.3.

4.1.1.2 *Target distance limit.* The target distance limit defines the maximum distance over which targets are considered in evaluating the site. Determine a separate target distance limit for each watershed as follows:

• If there is no observed release to surface water in the watershed or if there is an observed release only by direct observation (see section 4.1.2.1.1), begin measuring the target distance limit for the watershed at the probable point of entry to surface water and extend it for 15 miles along the surface water from that point.

• If there is an observed release from the site to the surface water in the watershed that is based on sampling, begin measuring the target distance limit for the watershed at the probable point of entry; extend the target distance limit either for 15 miles along the surface water or to the most distant sample point that meets the criteria for an observed release to that watershed, whichever is greater.

In evaluating the site, include only surface water targets (for example, intakes, fisheries, sensitive environments) that are within or contiguous to the hazardous substance migration path and located, partially or wholly, at or between the probable point of entry and the target distance limit applicable to the watershed:

• If flow within the hazardous substance migration path is reversed by tides, evaluate upstream targets only if there is documentation that the tidal run could carry substances from the site as far as those upstream targets.

• Determine whether targets within or contiguous to the hazardous substance migration path are subject to actual or potential contamination as follows:

–If a target is located, partially or wholly, either at or between the probable point of entry and any sampling point that meets the criteria for an observed release to the watershed or at a point that meets the criteria for an observed release by direct observation, evaluate that target as subject to actual contamination, except as otherwise specified for fisheries in section 4.1.3.3 and for wetlands in section 4.1.4.3.1.1. If the actual contamination is based on direct observation, assign Level II to the actual contamination. However, if the actual contamination is based on samples, determine whether the actual contamination is at Level I or Level II concentrations as specified in sections 4.1.2.3, 4.1.3.3, and 4.1.4.3.1.

–If a target is located, partially or wholly, within the target distance limit for the watershed, but not at or between the probable point of entry and any sampling point that meets the criteria for an observed release to the watershed, nor at a point that meets the criteria for an observed release by direct observation, evaluate it as subject to potential contamination.

For sites consisting solely of contaminated sediments with no identified source, determine the target distance limit as follows:

• If there is a clearly defined direction of flow for the surface water body (or bodies) containing the contaminated sediments, begin measuring the target distance limit at the point of observed sediment contamination that is farthest upstream (that is, at the location of the farthest available upstream sediment sample that meets the criteria for an observed release); extend the target distance limit either for 15 miles along the surface water or to the most distant downstream sample point that meets the criteria for an observed release to that watershed, whichever is greater.

• If there is no clearly defined direction of flow, begin measuring the target distance limit at the center of the area of observed sediment contamination. Extend the target distance limit as an arc either for 15 miles along the surface water or to the most distant sample point that meets the criteria for an observed release to that watershed, whichever is greater. Determine the area of observed sediment contamination based on available samples that meet the criteria for an observed release.

Note that the hazardous substance migration path for these contaminated sediment sites consists solely of the in-water segment defined by the target distance limit; there is no overland segment.

For these contaminated sediment sites, include only those targets (for example, intakes, fisheries, sensitive environments) that are within or contiguous to the hazardous substance migration path and located, wholly or partially, within the target distance limit for the site. Determine whether these targets are subject to actual or potential contamination as follows:

• If a target is located, partially or wholly, within the area of observed sediment contamination, evaluate it as subject to actual contamination, except as otherwise specified for fisheries in section 4.1.3.3 and wetlands in section 4.1.4.3.1.1.

–If a drinking water target is subject to actual contamination, evaluate it using Level II concentrations.

—If a human food chain target or environmental target is subject to actual contamination, evaluate it using Level I or Level II concentrations, as appropriate (see sections 4.1.3.3 and 4.1.4.3.1).

• If a target is located, partially or wholly, within the target distance limit for the watershed, but not within the area of observed sediment contamination, evaluate it as subject to potential contamination.

4.1.1.3 *Evaluation of overland/flood migration component.* Evaluate the drinking water threat, human food chain threat, and environmental threat for each watershed for this component based on three factor categories: likelihood of release, waste characteristics, and targets. Figure 4-1 indicates the factors included within each factor category for each type of threat.

Determine the overland/flood migration component score (S_{of}) for a watershed in terms of the factor category values as follows:

$$S_{of} = \sum_{i=1}^{3} \frac{(LR_i)(WC_i)(T_i)}{SF}$$

where:

LR_i = Likelihood of release factor category value for threat i (that is, drinking water, human food chain, or environmental threat).

WC_i = Waste characteristics factor category value for threat i.

T_i = Targets factor category value for threat i.

SF = Scaling factor.

Table 4-2 outlines the specific calculation procedure.

If the site is in only one watershed, assign the overland/flood migration score for that watershed as the overland/flood migration component score for the site.

BILLING CODE 6560-50-M

Likelihood of Release (LR)

Observed Release

or

Potential to Release by Overland Flow
- Containment
- Runoff
  - Rainfall
  - Drainage Area
  - Soil Group
- Distance to Surface Water

+

Potential to Release by Flood
- Containment (Flood)
- Flood Frequency

X

Drinking Water

Waste Characteristics (WC)

Toxicity/Persistence
- Toxicity
  - Chronic
  - Carcinogenic
  - Acute
- Persistence
  - Half-Life
  - K_{ow}

Hazardous Waste Quantity
- Hazardous Constituent Quantity
- Hazardous Wastestream Quantity
- Volume
- Area

X

Targets (T)

Nearest Intake

Population
- Level I Concentrations
- Level II Concentrations
- Potential Contamination

Resources

+

Human Food Chain

Waste Characteristics (WC)

Toxicity/Persistence/Bioaccumulation
- Toxicity
  - Chronic
  - Carcinogenic
  - Acute
- Persistence
  - Half-Life
  - K_{ow}
- Bioaccumulation Potential

Hazardous Waste Quantity
- Hazardous Constituent Quantity
- Hazardous Wastestream Quantity
- Volume
- Area

X

Targets (T)

Food Chain Individual

Population
- Level I Concentrations
  - Human Food Chain Production
- Level II Concentrations
  - Human Food Chain Production
- Potential Human Food Chain Contamination
  - Human Food Chain Production

+

Environmental

Waste Characteristics (WC)

Ecosystem Toxicity/Persistence/Bioaccumulation
- Ecosystem Toxicity
  - Ambient Water Quality Criteria
  - Ambient Aquatic Life Advisory Concentrations
- Persistence
  - Half-Life
  - K_{ow}
- Ecosystem Bioaccumulation Potential

Hazardous Waste Quantity
- Hazardous Constituent Quantity
- Hazardous Wastestream Quantity
- Volume
- Area

X

Targets (T)

Sensitive Environments
- Level I Concentrations
- Level II Concentrations
- Potential Contamination

FIGURE 4-1

OVERVIEW OF SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT

BILLING CODE 6560-50-C

TABLE 4-1.—SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET

Factor categories and factors	Maximum value	Value assigned
Drinking Water Threat		
Likelihood of Release:		
1. Observed Release	550	___
2. Potential to Release by Overland Flow:		
2a. Containment	10	___
2b. Runoff	25	___
2c. Distance to Surface Water	25	___
2d. Potential to Release by Overland Flow (lines 2a[2b+2c])	500	___
3. Potential to Release by Flood:		
3a. Containment (Flood)	10	___
3b. Flood Frequency	50	___
3c. Potential to Release by Flood (lines 3a×3b)	500	___
4. Potential to Release (lines 2d+3c, subject to a maximum of 500)	500	___
5. Likelihood of Release (higher of lines 1 and 4)	550	___
Waste Characteristics:		
6. Toxicity/Persistence	(a)	___
7. Hazardous Waste Quantity	(a)	___
8. Waste Characteristics	100	___
Targets:		
9. Nearest Intake	50	___
10. Population		
10a. Level I Concentrations	(b)	___
10b. Level II Concentrations	(b)	___
10c. Potential Contamination	(b)	___
10d. Population (lines 10a+10b+10c)	(b)	___
11. Resources	5	___
12. Targets (lines 9+10d+11)	(b)	___
Drinking Water Threat Score:		
13. Drinking Water Threat Score ([lines 5×8×12]/82,500, subject to a maximum of 100)	100	___
Human Food Chain Threat		
Likelihood of Release:		
14. Likelihood of Release (same value as line 5)	550	___
Waste Characteristics:		
15. Toxicity/Persistence/Bioaccumulation	(a)	___
16. Hazardous Waste Quantity	(a)	___
17. Waste Characteristics	1,000	___
Targets:		
18. Food Chain Individual	50	___
19. Population		
19a. Level I Concentrations	(b)	___
19b. Level II Concentrations	(b)	___
19c. Potential Human Food Chain Contamination	(b)	___
19d. Population (lines 19a+19b+19c)	(b)	___
20. Targets (lines 18+19d)	(b)	___
Human Food Chain Threat Score:		
21. Human Food Chain Threat Score ([lines 14×17×20]/82,500, subject to a maximum of 100)	100	___
Environmental Threat		
Likelihood of Release:		
22. Likelihood of Release (same value as line 5)	550	___
Waste Characteristics:		
23. Ecosystem Toxicity/Persistence/Bioaccumulation	(a)	___
24. Hazardous Waste Quantity	(a)	___
25. Waste Characteristics	1,000	
Targets:		
26. Sensitive Environments		
26a. Level I Concentrations	(b)	___
26b. Level II Concentrations	(b)	___
26c. Potential Contamination	(b)	___
26d. Sensitive Environments (lines 26a+26b+26c)	(b)	
27. Targets (value from line 26d)	(b)	
Environmental Threat Score:		
28. Environmental Threat Score ([lines 22×25×27]/82,500, subject to a maximum of 60)	60	___
Surface Water Overland/Flood Migration Component Score for a Watershed		
29. Watershed Score[c] (lines 13+21+28, subject to a maximum of 100)	100	___
Surface Water Overland/Flood Migration Component Score		
30. Component Score (S_{of})[c] (highest score from line 29 for all watersheds evaluated, subject to a maximum of 100)	100	___

[a] Maximum value applies to waste characteristics category.
[b] Maximum value not applicable.
[c] Do not round to nearest integer.

If the site is in more than one watershed:

- Calculate a separate overland/flood migration component score for each watershed, using likelihood of release, waste characteristics, and targets applicable to each watershed.
- Select the highest overland/flood migration component score from the watersheds evaluated and assign it as the overland/flood migration component score for the site.

4.1.2 *Drinking water threat.* Evaluate the drinking water threat for each watershed based on three factor categories: likelihood of release, waste characteristics, and targets.

4.1.2.1 *Drinking water threat—likelihood of release.* Evaluate the likelihood of release factor category for each watershed in terms of an observed release factor or a potential to release factor.

4.1.2.1.1 *Observed release.* Establish an observed release to surface water for a watershed by demonstrating that the site has released a hazardous substance to the surface water in the watershed. Base this demonstration on either:

- Direct observation:
  - –A material that contains one or more hazardous substances has been seen entering surface water through migration or is known to have entered surface water through direct deposition, or
  - –A source area has been flooded at a time that hazardous substances were present, and one or more hazardous substances were in contact with the flood waters, or
  - –When evidence supports the inference of a release of a material that contains one or more hazardous substances by the site to surface water, demonstrated adverse effects associated with that release may also be used to establish an observed release.
- Chemical analysis:
  - –Analysis of surface water, benthic, or sediment samples indicates that the concentration of hazardous substance(s) has increased significantly above the background concentration for the site for that type of sample (see section 2.3).
    - –Limit comparisons to similar types of samples and background concentrations—for example, compare surface water samples to surface water background concentrations.
    - –For benthic samples, limit comparisons to essentially sessile organisms.
  - –Some portion of the significant increase must be attributable to the site to establish the observed release, except: when the site itself consists of contaminated sediments with no identified source, no separate attribution is required.

If an observed release can be established for a watershed, assign an observed release factor value of 550 to that watershed, enter this value in Table 4–1, and proceed to section 4.1.2.1.3. If no observed release can be established for the watershed, assign an observed release factor value of 0 to that watershed, enter this value in Table 4–1, and proceed to section 4.1.2.1.2.

4.1.2.1.2 *Potential to release.* Evaluate potential to release only if an observed release cannot be established for the watershed. Evaluate potential to release based on two components: potential to release by overland flow (see section 4.1.2.1.2.1) and potential to release by flood (see section 4.1.2.1.2.2). Sum the values for these two components to obtain the potential to release factor value for the watershed, subject to a maximum value of 500.

4.1.2.1.2.1 *Potential to release by overland flow.* Evaluate potential to release by overland flow for the watershed based on three factors: containment, runoff, and distance to surface water.

Assign potential to release by overland flow a value of 0 for the watershed if:

- No overland segment of the hazardous substance migration path can be defined for the watershed, or
- The overland segment of the hazardous substance migration path for the watershed exceeds 2 miles before surface water is encountered.

If either condition applies, enter a value of 0 in Table 4–1 and proceed to section 4.1.2.1.2.2 to evaluate potential to release by flood. If neither applies, proceed to section 4.1.2.1.2.1.1 to evaluate potential to release by overland flow.

4.1.2.1.2.1.1 *Containment.* Determine the containment factor value for the watershed as follows:

- If one or more sources is located in surface water in the watershed (for example, intact sealed drums in surface water), assign the containment factor a value of 10 for the watershed. Enter this value in Table 4–1.
- If none of the sources is located in surface water in the watershed, assign a containment factor value from Table 4–2 to each source at the site that can potentially release hazardous substances to the hazardous substance migration path for this watershed. Assign the containment factor value for the watershed as follows:
  - –Select the highest containment factor value assigned to those sources that meet the minimum size requirement described below. Assign this highest value as the containment factor value for the watershed. Enter this value in Table 4–1.
  - –If, for this watershed, no source at the site meets the minimum size requirement, then select the highest containment factor value assigned to the sources at the site eligible to be evaluated for this watershed and assign it as the containment factor value for the watershed. Enter this value in Table 4–1.

A source meets the minimum size requirement if its source hazardous waste quantity value (see section 2.4.2.1.5) is 0.5 or more. Do not include the minimum size requirement in evaluating any other factor of this surface water migration component, except potential to release by flood as specified in section 4.1.2.1.2.2.3.

4.1.2.1.2.1.2 *Runoff.* Evaluate runoff based on three components: rainfall, drainage area, and soil group.

TABLE 4–2.—CONTAINMENT FACTOR VALUES FOR SURFACE WATER MIGRATION PATHWAY

Source	Assigned value
All Sources (Except Surface Impoundments, Land Treatment, Containers, and Tanks)	
Evidence of hazardous substance migration from source area (i.e., source area includes source and any associated containment structures)	10
No evidence of hazardous substance migration from source area *and*:	
(a) Neither of the following present: (1) maintained engineered cover, or (2) functioning and maintained run-on control system and runoff management system	10
(b) Any one of the two items in (a) present	9
(c) Any two of the following present: (1) maintained engineered cover, or (2) functioning and maintained run-on control system and runoff management system, or (3) liner with functioning leachate collection and removal system immediately above liner	7
(d) All items in (c) present	5
(e) All items in (c) present, plus no bulk or non-containerized liquids nor materials containing free liquids deposited in source area	3
No evidence of hazardous substance migration from source area, double liner with functioning leachate collection and removal system above and between liners, *and*:	
(f) Only one of the following deficiencies present in containment: (1) bulk or noncontainerized liquids or materials containing free liquids deposited in source area, or (2) no or nonfunctioning or nonmaintained run-on control system and runoff management system, or (3) no or nonmaintained engineered cover	3
(g) None of the deficiencies in (f) present	0
Source area inside or under maintained intact structure that provides protection from precipitation so that neither runoff nor leachate is generated, liquids or materials containing free liquids not deposited in source area, and functioning and maintained run-on control present	

TABLE 4-2.—CONTAINMENT FACTOR VALUES FOR SURFACE WATER MIGRATION PATHWAY—Concluded

Source	Assigned value
Surface Impoundment	
Evidence of hazardous substance migration from surface impoundment	10
Free liquids present with either no diking, unsound diking, or diking that is not regularly inspected and maintained	10
No evidence of hazardous substance migration from surface impoundment, free liquids present, sound diking that is regularly inspected and maintained, adequate freeboard, *and:*	
(a) No liner	9
(b) Liner	7
(c) Liner with functioning leachate collection and removal system below liner	5
(d) Double liner with functioning leachate collection and removal system between liners	3
No evidence of hazardous substance migration from surface impoundment and all free liquids eliminated at closure (either by removal of liquids or solidification of remaining wastes and waste residues).	Evaluate using All Sources criteria (with no bulk or free liquids deposited).
Land Treatment	
Evidence of hazardous substance migration from land treatment zone	10
No functioning and maintained run-on control and runoff management system	10
No evidence of hazardous substance migration from land treatment zone *and:*	
(a) Functioning and maintained run-on control and runoff management system	7
(b) Functioning and maintained run-on control and runoff management system, and vegetative cover established over entire land treatment area.	5
(c) Land treatment area maintained in compliance with 40 CFR 264.280	0
Containers	
All containers buried	Evaluate using All Sources criteria.
Evidence of hazardous substance migration from container area (i.e., container area includes containers and any associated containment structures).	10
No diking (or no similar structure) surrounding container area	10
Diking surrounding container area unsound or not regularly inspected and maintained	10
No evidence of hazardous substance migration from container area and container area surrounded by sound diking that is regularly inspected and maintained.	9
No evidence of hazardous substance migration from container area, container area surrounded by sound diking that is regularly inspected and maintained, *and:*	9
(a) Essentially impervious base under container area with liquids collection and removal system	7
(b) Containment system includes essentially impervious base, liquids collection system, sufficient capacity to contain 10 percent of volume of all containers, and functioning and maintained run-on control; and spilled or leaked hazardous substances and accumulated precipitation removed in timely manner to prevent overflow of collection system, at least weekly inspection of containers, hazardous substances in leaking or deteriorating containers transferred to containers in good condition, and containers sealed except when waste is added or removed.	5
(c) Free liquids present, containment system has sufficient capacity to hold total volume of all containers and to provide adequate freeboard, and single liner under container area with functioning leachate collection and removal system below liner.	5
(d) Same as (c) except: double liner under container area with functioning leachate collection and removal system between liners	3
Containers inside or under maintained intact structure that provides protection from precipitation so that neither runoff nor leachate would be generated from any unsealed or ruptured containers, liquids or materials containing free liquids not deposited in any container, and functioning and maintained run-on control present.	0
No evidence of hazardous substance migration from container area, containers leaking, and all free liquids eliminated at closure (either by removal of liquids or solidification of remaining wastes and waste residues).	Evaluate using All Sources criteria (with no bulk or free liquids deposited).
Tank	
Below-ground tank	Evaluate using All Sources criteria
Evidence of hazardous substance migration from tank area (i.e., tank area includes tank, ancillary equipment such as piping, and any associated containment structures).	10
No diking (or no similar structure) surrounding tank and ancillary equipment	10
Diking surrounding tank and ancillary equipment unsound or not regularly inspected and maintained	10
No evidence of hazardous substance migration from tank area and tank and ancillary equipment surrounded by sound diking that is regularly inspected and maintained.	9
No evidence of hazardous substance migration from tank area, tank and ancillary equipment surrounded by sound diking that is regularly inspected and maintained, *and:*	
(a) Tank and ancillary equipment provided with secondary containment (e.g., liner under tank area, vault system, double-wall) with leak detection and collection system.	7
(b) Tank and ancillary equipment provided with secondary containment system that detects and collects spilled or leaked hazardous substances and accumulated precipitation and has sufficient capacity to contain 110 percent of volume of largest tank within containment area, spilled or leaked hazardous substances and accumulated precipitation removed in a timely manner, at least weekly inspection of tank and secondary containment system, and all leaking or unfit-for-use tank systems promptly responded to.	5
(c) Containment system has sufficient capacity to hold total volume of all tanks within the tank containment area and to provide adequate freeboard, and single liner under tank containment area with functioning leachate collection and removal system below liner.	5
(d) Same as (c) except: double liner under tank containment area with functioning leachate collection and removal system between liners.	3
Tank is above ground, and inside or under maintained intact structure that provides protection from precipitation so that neither runoff nor leachate would be generated from any material released from tank, liquids or materials containing free liquids not deposited in any tank, and functioning and maintained run-on control present.	0

Rainfall. Determine the 2-year, 24-hour rainfall for the site. Use site-specific, 2-year, 24-hour rainfall data if records are available for at least 20 years. If such site-specific data are not available, estimate the 2-year, 24-hour rainfall for the site from a rainfall-frequency map. Do not round the rainfall value to the nearest integer.

Drainage area. Determine the drainage area for the sources at the site. Include in this drainage area both the source areas and the area upgradient of the sources, but exclude any portion of this drainage area for which runoff is diverted from entering the sources by storm sewers or run-on control and/or runoff management systems. Assign a drainage area value for the watershed from Table 4-3.

Soil group. Based on the predominant soil group within the drainage area described above, assign a soil group designation for the watershed from Table 4-4 as follows:

- Select the predominant soil group as that type which comprises the largest total area within the applicable drainage area.
- If a predominant soil group cannot be delineated, select that soil group in the drainage area that yields the highest value for the runoff factor.

Calculation of runoff factor value. Assign a combined rainfall/runoff value for the watershed from Table 4-5, based on the 2-year, 24-hour rainfall and the soil group designation. Determine the runoff factor value for the watershed from Table 4-6, based on the rainfall/runoff and drainage area values. Enter the runoff factor value in Table 4-1.

TABLE 4-3.—DRAINAGE AREA VALUES

Drainage area (acres)	Assigned value
Less than 50	1
50 to 250	2
Greater than 250 to 1,000	3
Greater than 1,000	4

TABLE 4-4.—SOIL GROUP DESIGNATIONS

Surface soil description	Soil group designation
Coarse-textured soils with high infiltration rates (for example, sands, loamy sands).	A
Medium-textured soils with moderate infiltration rates (for example, sandy loams, loams).	B
Moderately fine-textured soils with low infiltration rates (for example, silty loams, silts, sandy clay loams).	C
Fine-textured soils with very low infiltration rates (for example, clays, sandy clays, silty clay loams, clay loams, silty clays); or impermeable surfaces (for example, pavement).	D

TABLE 4-5.—RAINFALL/RUNOFF VALUES

2-Year, 24-hour rainfall (inches)	Soil group designation			
	A	B	C	D
Less than 1.0	0	0	2	3
1.0 to less than 1.5	0	1	2	3
1.5 to less than 2.0	0	2	3	4
2.0 to less than 2.5	1	2	3	4
2.5 to less than 3.0	2	3	4	4
3.0 to less than 3.5	2	3	4	5
3.5 or greater	3	4	5	6

TABLE 4-6.—RUNOFF FACTOR VALUES

Drainage area value	Rainfall/runoff value						
	0	1	2	3	4	5	6
1	0	0	0	1	1	1	1
2	0	0	1	1	2	3	4
3	0	0	1	3	7	11	15
4	0	1	2	7	17	25	25

4.1.2.1.2.1.3 *Distance to surface water.* Evaluate the distance to surface water as the shortest distance, along the overland segment, from any source with a surface water containment factor value greater than 0 to either the mean high water level for tidal waters or the mean water level for other surface waters. Based on this distance, assign a value from Table 4-7 to the distance to surface water factor for the watershed. Enter this value in Table 4-1.

4.1.2.1.2.1.4 *Calculation of factor value for potential to release by overland flow.* Sum the factor values for runoff and distance to surface water for the watershed and multiply this sum by the factor value for containment. Assign the resulting product as the factor value for potential to release by overland flow for the watershed. Enter this value in Table 4-1.

4.1.2.1.2.2 *Potential to release by flood.* Evaluate potential to release by flood for each watershed as the product of two factors: containment (flood) and flood frequency. Evaluate potential to release by flood separately for each source that is within the watershed. Furthermore, for each source, evaluate potential to release by flood separately for each category of floodplain in which the source lies. (See section 4.1.2.1.2.2.2 for the applicable floodplain categories.) Calculate the value for the potential to release by flood factor as specified in 4.1.2.1.2.2.3.

4.1.2.1.2.2.1 *Containment (flood).* For each source within the watershed, separately evaluate the containment (flood) factor for each category of floodplain in which the source is partially or wholly located. Assign a containment (flood) factor value from Table 4-8 to each floodplain category applicable to that source. Assign a containment (flood) factor value of 0 to each floodplain category in which the source does not lie.

4.1.2.1.2.2.2 *Flood frequency.* For each source within the watershed, separately evaluate the flood frequency factor for each category of floodplain in which the source is partially or wholly located. Assign a flood frequency factor value from Table 4-9 to each floodplain category in which the source is located.

4.1.2.1.2.2.3 *Calculation of factor value for potential to release by flood.* For each source within the watershed and for each category of floodplain in which the source is partially or wholly located, calculate a separate potential to release by flood factor value. Calculate this value as the product of the containment (flood) value and the flood frequency value applicable to the source for the floodplain category. Select the highest value calculated for those sources that meet the minimum size requirement specified in section 4.1.2.1.2.1.1 and assign it as the value for the potential to release by flood factor for the watershed. However, if, for this watershed, no source at the site meets the minimum size requirement, select the highest value calculated for the sources at the site eligible to be evaluated for this watershed and assign it as the value for this factor.

TABLE 4-7.—DISTANCE TO SURFACE WATER FACTOR VALUES

Distance	Assigned value
Less than 100 feet	25
100 feet to 500 feet	20
Greater than 500 feet to 1,000 feet	16
Greater than 1,000 feet to 2,500 feet	9
Greater than 2,500 feet to 1.5 miles	6
Greater than 1.5 miles to 2 miles	3

TABLE 4-8.—CONTAINMENT (FLOOD) FACTOR VALUES

Containment criteria	Assigned value
Documentation that containment at the source is designed, constructed, operated, and maintained to prevent a washout of hazardous substances by the flood being evaluated.	0
Other	10

TABLE 4-9.—FLOOD FREQUENCY FACTOR VALUES

Floodplain category	Assigned value
Source floods annually	50
Source in 10-year floodplain	50
Source in 100-year floodplain	25
Source in 500-year floodplain	7
None of above	0

Enter this highest potential to release by flood factor value for the watershed in Table 4-1, as well as the values for containment (flood) and flood frequency that yield this highest value.

4.1.2.1.2.3 *Calculation of potential to release factor value.* Sum the factor values assigned to the watershed for potential to release by overland flow and potential to release by flood. Assign this sum as the potential to release factor value for the watershed, subject to a maximum value of 500. Enter this value in Table 4-1.

4.1.2.1.3 *Calculation of drinking water threat-likelihood of release factor category value.* If an observed release is established for the watershed, assign the observed release factor value of 550 as the likelihood of release factor category value for that watershed. Otherwise, assign the potential to release factor value for that watershed as the likelihood of release factor category value for that watershed. Enter the value assigned in Table 4-1.

4.1.2.2 *Drinking water threat-waste characteristics.* Evaluate the waste characteristics factor category for each watershed based on two factors: toxicity/persistence and hazardous waste quantity. Evaluate only those hazardous substances that are available to migrate from the sources at the site to surface water in the watershed via the overland/flood hazardous substance migration path for the watershed (see section 4.1.1.1). Such hazardous substances include:

• Hazardous substances that meet the criteria for an observed release to surface water in the watershed.

• All hazardous substances associated with a source that has a surface water containment factor value greater than 0 for the watershed (see sections 2.2.2, 2.2.3, 4.1.2.1.2.1.1, and 4.1.2.1.2.2.1).

4.1.2.2.1 *Toxicity/persistence.* For each hazardous substance, assign a toxicity factor value, a persistence factor value, and a combined toxicity/persistence factor value as specified in sections 4.1.2.2.1.1 through 4.1.2.2.1.3. Select the toxicity/persistence factor value for the watershed as specified in section 4.1.2.2.1.3.

4.1.2.2.1.1 *Toxicity.* Assign a toxicity factor value to each hazardous substance as specified in section 2.4.1.1.

4.1.2.2.1.2 *Persistence.* Assign a persistence factor value to each hazardous substance. In assigning this value, evaluate persistence based primarily on the half-life of the hazardous substance in surface water and secondarily on the sorption of the hazardous substance to sediments. The half-life in surface water is defined for HRS purposes as the time required to reduce the initial concentration in surface water by one-half as a result of the combined decay processes of biodegradation, hydrolysis, photolysis, and volatilization. Sorption to sediments is evaluated for the HRS based on the logarithm of the n-octanol-water partition coefficient (log K_{ow}) of the hazardous substance.

Estimate the half-life ($t_{1/2}$) of a hazardous substance as follows:

$$t_{1/2}=\frac{1}{\frac{1}{h}+\frac{1}{b}+\frac{1}{p}+\frac{1}{v}}$$

where:
h=Hydrolysis half-life.
b=Biodegradation half-life.
p=Photolysis half-life.
v=Volatilization half-life.

If one or more of these four component half-lives cannot be estimated for the hazardous substance from available data, delete that component half-life from the above equation. If none of these four component half-lives can be estimated for the hazardous substance from available data, use the default procedure indicated below. Estimate a half-life for the hazardous substance for lakes or for rivers, oceans, coastal tidal waters, and Great Lakes, as appropriate.

If a half-life can be estimated for a hazardous substance:

• Assign that hazardous substance a persistence factor value from the appropriate portion of Table 4–10 (that is lakes; or rivers, oceans, coastal tidal waters, and Great Lakes).

• Select the appropriate portion of Table 4–10 as follows:

–If there is one or more drinking water intakes along the hazardous substance migration path for the watershed, select the nearest drinking water intake as measured from the probable point of entry. If the in-water segment between the probable point of entry and this selected intake includes both lakes and other water bodies, use the lakes portion of Table 4–10 only if more than half the distance to this selected intake lies in lake(s). Otherwise, use the rivers, oceans, coastal tidal waters, and Great Lakes portion of Table 4–10. For contaminated sediments with no identified source, use the point where measurement begins (see section 4.1.1.2) rather than the probable point of entry.

–If there are no drinking water intakes but there are intakes or points of use for any of the resource types listed in section 4.1.2.3.3, select the nearest such intake or point of use. Select the portion of Table 4–10 based on this intake or point of use in the manner specified for drinking water intakes.

–If there are no drinking water intakes and no specified resource intakes and points of use, but there is another type of resource listed in section 4.1.2.3.3 (for example, the water is usable for drinking water purposes even though not used), select the portion of Table 4–10 based on the nearest point of this resource in the manner specified for drinking water intakes.

TABLE 4–10.—PERSISTENCE FACTOR VALUES—HALF-LIFE

Surface water category	Substance half-life (days)	Assigned value [a]
Rivers, oceans, coastal tidal waters, and Great Lakes	Less than or equal to 0.2	0.0007
	Greater than 0.2 to 0.5	0.07
	Greater than 0.5 to 1.5	0.4
	Greater than 1.5	1
Lakes	Less than or equal to 0.02	0.0007
	Greater than 0.02 to 2	0.07
	Greater than 2 to 20	0.4
	Greater than 20	1

[a] Do not round to nearest integer.

If a half-life cannot be estimated for a hazardous substance from available data, use the following default procedure to assign a persistence factor value to that hazardous substance:

• For those hazardous substances that are metals (or metalloids), assign a persistence factor value of 1 as a default for all surface water bodies.

• For other hazardous substances (both organic and inorganic), assign a persistence factor value of 0.4 as a default for rivers, oceans, coastal tidal waters, and Great Lakes, and a persistence factor value of 0.07 as a default for lakes. Select the appropriate value in the same manner specified for using Table 4–10.

Use the persistence factor value assigned based on half-life or the default procedure unless the hazardous substance can be assigned a higher factor value from Table 4–11, based on its Log K_{ow}. If a higher value can be assigned from Table 4–11, assign this higher value as the persistence factor value for the hazardous substance.

TABLE 4–11.—PERSISTENCE FACTOR VALUES—LOG K_{ow}

Log K_{ow}	Assigned value [a]
Less than 3.5	0.0007
3.5 to less than 4.0	0.07
4.0 to 4.5	0.4
Greater than 4.5	1

TABLE 4–11.—PERSISTENCE FACTOR VALUES—LOG K_{ow}—Concluded

[a] Use for lakes, rivers, oceans, coastal tidal waters, and Great Lakes. Do not round to nearest integer.

4.1.2.2.1.3 *Calculation of toxicity/persistence factor value.* Assign each hazardous substance a toxicity/persistence factor value from Table 4–12, based on the values assigned to the hazardous substance for the toxicity and persistence factors. Use the hazardous substance with the highest toxicity/persistence factor value for the watershed to assign the toxicity/persistence factor value for the drinking water threat for the watershed. Enter this value in Table 4-1.

4.1.2.2.2 *Hazardous waste quantity.* Assign a hazardous waste quantity factor value for the watershed as specified in section 2.4.2. Enter this value in Table 4-1.

4.1.2.2.3 *Calculation of drinking water threat-waste characteristics factor category value.* Multiply the toxicity/persistence and hazardous waste quantity factor values for the watershed, subject to a maximum product of 1 x 10^8. Based on this product, assign a value from Table 2-7 (section 2.4.3.1) to the drinking water threat-waste characteristics factor category for the watershed. Enter this value in Table 4-1.

TABLE 4-12.—TOXICITY/PERSISTENCE FACTOR VALUES [a]

Persistence factor value	Toxicity factor value					
	10,000	1,000	100	10	1	0
1.0	10,000	1,000	100	10	1	0
0.4	4,000	400	40	4	0.4	0
0.07	700	70	7	0.7	0.07	0
0.0007	7	0.7	0.07	0.007	0.0007	0

[a] Do not round to nearest integer.

4.1.2.3 *Drinking water threat-targets.* Evaluate the targets factor category for each watershed based on three factors: nearest intake, population, and resources.

To evaluate the nearest intake and population factors, determine whether the target surface water intakes are subject to actual or potential contamination as specified in section 4.1.1.2. Use either an observed release based on direct observation at the intake or the exposure concentrations from samples (or comparable samples) taken at or beyond the intake to make this determination (see section 4.1.2.1.1). The exposure concentrations for a sample (that is, surface water, benthic, or sediment sample) consist of the concentrations of those hazardous substances present that are significantly above background levels and attributable at least in part to the site (that is, those hazardous substance concentrations that meet the criteria for an observed release).

When an intake is subject to actual contamination, evaluate it using Level I concentrations or Level II concentrations. If the actual contamination is based on an observed release by direct observation, use Level II concentrations for that intake. However, if the actual contamination is based on an observed release from samples, determine which level applies for the intake by comparing the exposure concentrations from samples (or comparable samples) to health-based benchmarks as specified in sections 2.5.1 and 2.5.2. Use the health-based benchmarks from Table 3-10 (section 3.3.1) in determining the level of contamination from samples. For contaminated sediments with no identified source, evaluate the actual contamination using Level II concentrations (see section 4.1.1.2).

4.1.2.3.1 *Nearest intake.* Evaluate the nearest intake factor based on the drinking water intakes along the overland/flood hazardous substance migration path for the watershed. Include standby intakes in evaluating this factor only if they are used for supply at least once a year.

Assign the nearest intake factor a value as follows and enter the value in Table 4-1:

- *If one or more of these drinking water intakes is subject to Level I concentrations as specified in section 4.1.2.3, assign a factor value of 50.*
- If not, but if one or more of these drinking water intakes is subject to Level II concentrations, assign a factor value of 45.
- If none of these drinking water intakes is subject to Level I or Level II concentrations, determine the nearest of these drinking water intakes, as measured from the probable point of entry (or from the point where measurement begins for contaminated sediments with no identified source). Assign a dilution weight from Table 4-13 to this intake, based on the type of surface water body in which it is located. Multiply this dilution weight by 20, round the product to the nearest integer, and assign it as the factor value.

Assign the dilution weight from Table 4-13 as follows:

TABLE 4-13.—SURFACE WATER DILUTION WEIGHTS

Type of surface water body [a]		Assigned dilution weight [b]
Descriptor	Flow characteristics	
Minimal stream	Less than 10 cfs [c]	1
Small to moderate stream	10 to 100 cfs	0.1
Moderate to large stream	Greater than 100 to 1,000 cfs	0.01
Large stream to river	Greater than 1,000 to 10,000 cfs	0.001
Large river	Greater than 10,000 to 100,000 cfs	0.0001
Very large river	Greater than 100,000 cfs	0.00001
Coastal tidal waters [d]	Flow not applicable, depth not applicable	0.0001
Shallow ocean zone [e] or Great Lake	Flow not applicable, depth less than 20 feet	0.0001
Moderate depth ocean zone [e] or Great Lake	Flow not applicable, depth 20 to 200 feet	0.00001
Deep ocean zone [e] or Great Lake	Flow not applicable, depth greater than 200 feet	0.000005
3-mile mixing zone in quiet flowing river	10 cfs or greater	0.5

[a] Treat each lake as a separate type of water body and assign a dilution weight as specified in text.
[b] Do not round to nearest integer.
[c] cfs = cubic feet per second.
[d] Embayments, harbors, sounds, estuaries, back bays, lagoons, wetlands, etc., seaward from mouths of rivers and landward from baseline of Territorial Sea.
[e] Seaward from baseline of Territorial Sea. This baseline represents the generalized U.S. coastline. It is parallel to the seaward limit of the Territorial Sea and other maritime limits such as the inner boundary of the Federal fisheries jurisdiction and the limit of States jurisdiction under the Submerged Lands Act, as amended.

- For a river (that is, surface water body types specified in Table 4-13 as minimal stream through very large river), assign a dilution weight based on the average annual flow in the river at the intake. If available, use the average annual discharge as defined in the U.S. Geological Survey Water Resources Data Annual Report. Otherwise, estimate the average annual flow.
- For a lake, assign a dilution weight as follows:
  - For a lake that has surface water flow entering the lake, assign a dilution weight based on the sum of the

average annual flows for the surface water bodies entering the lake up to the point of the intake.

–For a lake that has no surface water flow entering, but that does have surface water flow leaving, assign a dilution weight based on the sum of the average annual flows for the surface water bodies leaving the lake.

–For a closed lake (that is, a lake without surface water flow entering or leaving), assign a dilution weight based on the average annual ground water flow into the lake, if available, using the dilution weight for the corresponding river flow rate in Table 4–13. If not available, assign a default dilution weight of 1.

• For the ocean and the Great Lakes, assign a dilution weight based on depth.

• For coastal tidal waters, assign a dilution weight of 0.0001; do not consider depth or flow.

• For a quiet-flowing river that has average annual flow of 10 cubic feet per second (cfs) or greater and that contains the probable point of entry to surface water, apply a zone of mixing in assigning the dilution weight:

–Start the zone of mixing at the probable point of entry and extend it for 3 miles from the probable point of entry, except: if the surface water characteristics change to turbulent within this 3-mile distance, extend the zone of mixing only to the point at which the change occurs.

–Assign a dilution weight of 0.5 to any intake that lies within this zone of mixing.

–Beyond this zone of mixing, assign a dilution weight the same as for any other river (that is, assign the dilution weight based on average annual flow).

–Treat a quiet-flowing river with an average annual flow of less than 10 cfs the same as any other river (that is, assign it a dilution weight of 1).

In those cases where water flows from a surface water body with a lower assigned dilution weight (from Table 4–13) to a surface water body with a higher assigned dilution weight (that is, water flows from a surface water body with more dilution to one with less dilution), use the lower assigned dilution weight as the dilution weight for the latter surface water body.

4.1.2.3.2 *Population.* In evaluating the population factor, include only persons served by drinking water drawn from intakes that are along the overland/flood hazardous substance migration path for the watershed and that are within the target distance limit specified in section 4.1.1.2. Include residents, students, and workers who regularly use the water. Exclude transient populations such as customers and travelers passing through the area. When a standby intake is maintained on a regular basis so that water can be withdrawn, include it in evaluating the population factor.

In estimating residential population, when the estimate is based on the number of residences, multiply each residence by the average number of persons per residence for the county in which the residence is located.

In estimating the population served by an intake, if the water from the intake is blended with other water (for example, water from other surface water intakes or ground water wells), apportion the total population regularly served by the blended system to the intake based on the intake's relative contribution to the total blended system. In estimating the intake's relative contribution, assume each well or intake contributes equally and apportion the population accordingly, except: if the relative contribution of any one intake or well exceeds 40 percent based on average annual pumpage or capacity, estimate the relative contribution of the wells and intakes considering the following data, if available:

• Average annual pumpage from the ground water wells and surface water intakes in the blended system.

• Capacities of the wells and intakes in the blended system.

For systems with standby surface water intakes or standby ground water wells, apportion the total population regularly served by the blended system as described above, except:

• Exclude standby ground water wells in apportioning the population.

• When using pumpage data for a standby surface water intake, use average pumpage for the period during which the standby intake is used rather than average annual pumpage.

• For that portion of the total population that could be apportioned to a standby surface water intake, assign that portion of the population either to that standby intake or to the other surface water intake(s) and ground water well(s) that serve that population; do not assign that portion of the population both to the standby intake and to the other intake(s) and well(s) in the blended system. Use the apportioning that results in the highest population factor value. (Either include all standby intake(s) or exclude some or all of the standby intake(s) as appropriate to obtain this highest value.) Note that the specific standby intake(s) included or excluded and, thus, the specific apportioning may vary in evaluating different watersheds and in evaluating the ground water pathway.

4.1.2.3.2.1 *Level of contamination.* Evaluate the population factor based on three factors: Level I concentrations, Level II concentrations, and potential contamination. Determine which factor applies for an intake as specified in section 4.1.2.3. Evaluate intakes subject to Level I concentration as specified in section 4.1.2.3.2.2, intakes subject to Level II concentration as specified in section 4.1.2.3.2.3, and intakes subject to potential contamination as specified in section 4.1.2.3.2.4.

For the potential contamination factor, use population ranges in evaluating the factor as specified in section 4.1.2.3.2.4. For the Level I and Level II concentrations factors, use the population estimate, not population ranges, in evaluating both factors.

4.1.2.3.2.2 *Level I concentrations.* Sum the number of people served by drinking water from intakes subject to Level I concentrations. Multiply this sum by 10. Assign this product as the value for this factor. Enter this value in Table 4–1.

4.1.2.3.2.3 *Level II concentrations.* Sum the number of people served by drinking water from intakes subject to Level II concentrations. Do not include people already counted under the Level I concentrations factor. Assign this sum as the value for this factor. Enter this value in Table 4–1.

4.1.2.3.2.4 *Potential contamination.* For each applicable type of surface water body in Table 4–14, first determine the number of people served by drinking water from intakes subject to potential contamination in that type of surface water body. Do not include those people already counted under the Level I and Level II concentrations factors.

BILLING CODE 6560-50-M

TABLE 4-14

DILUTION-WEIGHTED POPULATION VALUES FOR POTENTIAL CONTAMINATION FACTOR FOR SURFACE WATER MIGRATION PATHWAY[a]

Type of Surface Water Body[b]	Number of People								
	0	1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,000	10,001 to 30,000
Minimal stream (< 10 cfs)	0	4	17	53	164	522	1,633	5,214	16,325
Small to moderate stream (10 to 100 cfs)	0	0.4	2	5	16	52	163	521	1,633
Moderate to large stream (> 100 to 1,000 cfs)	0	0.04	0.2	0.5	2	5	16	52	163
Large stream to river (> 1,000 to 10,000 cfs)	0	0.004	0.02	0.05	0.2	0.5	2	5	16
Large river (> 10,000 to 100,000 cfs)	0	0	0.002	0.005	0.02	0.05	0.2	0.5	2
Very large river (> 100,000 cfs)	0	0	0	0.001	0.002	0.005	0.02	0.05	0.2
Shallow ocean zone or Great Lake (depth < 20 feet)	0	0	0.002	0.005	0.02	0.05	0.2	0.5	2
Moderate ocean zone or Great Lake (depth 20 to 200 feet)	0	0	0	0.001	0.002	0.005	0.02	0.05	0.2
Deep ocean zone or Great Lakes (depth > 200 feet)	0	0	0	0	0.001	0.003	0.008	0.03	0.08
3-mile mixing zone in quiet flowing river (≥ 10 cfs)	0	2	9	26	82	261	817	2,607	8,163

TABLE 4-14 (Concluded)

	Number of People				
Type of Surface Water Body[b]	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	1,000,001 to 3,000,000	3,000,001 to 10,000,000
Minimal stream (< 10 cfs)	52,137	163,246	521,360	1,632,455	5,213,590
Small to moderate stream (10 to 100 cfs)	5,214	16,325	52,136	163,245	521,359
Moderate to large stream (> 100 to 1,000 cfs)	521	1,633	5,214	16,325	52,136
Large stream to river (> 1,000 to 10,000 cfs)	52	163	521	1,632	5,214
Large river (> 10,000 to 100,000 cfs)	5	16	52	163	521
Very large river (> 100,000 cfs)	0.5	2	5	16	52
Shallow ocean zone or Great Lake (depth < 20 feet)	5	16	52	163	521
Moderate ocean zone or Great Lake (depth 20 to 200 feet)	0.5	2	5	16	52
Deep zone or Great Lake (depth > 200 feet)	0.3	1	3	8	26
3-mile mixing zone in quiet flowing river (≥ 10 cfs)	26,068	81,623	260,680	816,227	2,606,795

[a]Round the number of people to nearest integer. Do not round the assigned dilution-weighted population value to nearest integer.

[b]Treat each lake as a separate type of water body and assign it a dilution-weighted population value using the surface water body type with the same dilution weight from Table 4-13 as the lake. If drinking water is withdrawn from coastal tidal water or the ocean, assign a dilution-weighted population value to it using the surface water body type with the same dilution weight from Table 4-13 as the coastal tidal water or the ocean zone.

BILLING CODE 6560-50-C

For each type of surface water body, assign a dilution-weighted population value from Table 4-14, based on the number of people included for that type of surface water body. (Note that the dilution-weighted population values in Table 4-14 incorporate the dilution weights from Table 4-13. Do not multiply the values from Table 4-14 by these dilution weights.)

Calculate the value for the potential contamination factor (PC) for the watershed as follows:

$$PC = \frac{1}{10} \sum_{i=1}^{n} W_i$$

where:

W_i=Dilution-weighted population from Table 4-14 for surface water body type i.

n=Number of different surface water body types in the watershed.

If PC is less than 1, do not round it to the nearest integer; if PC is 1 or more, round to the nearest integer. Enter this value for the potential contamination factor in Table 4-1.

4.1.2.3.2.5 *Calculation of population factor value.* Sum the factor values for Level I concentrations, Level II concentrations, and potential contamination. Do not round this sum to the nearest integer. Assign this sum as the population factor value for the watershed. Enter this value in Table 4-1.

4.1.2.3.3 *Resources.* To evaluate the resources factor for the watershed, select the highest value below that applies to the watershed. Assign this value as the resources factor value for the watershed. Enter this value in Table 4-1.

Assign a value of 5 if, within the in-water segment of the hazardous substance migration path for the watershed, the surface water is used for one or more of the following purposes:

- Irrigation (5 acre minimum) of commercial food crops or commercial forage crops.
- Watering of commercial livestock.
- Ingredient in commercial food preparation.
- Major or designated water recreation area, excluding drinking water use.

Assign a value of 5 if, within the in-water segment of the hazardous substance migration path for the watershed, the surface water is not used for drinking water, but either of the following applies:

- Any portion of the surface water is designated by a State for drinking water use under section 305(a) of the Clean Water Act, as amended.
- Any portion of the surface water is usable for drinking water purposes.

Assign a value of 0 if none of the above applies.

4.1.2.3.4 *Calculation of drinking water threat-targets factor category value.* Sum the nearest intake, population, and resources factor values for the watershed. Do not round this sum to the nearest integer. Assign this sum as the drinking water threat-targets factor category value for the watershed. Enter this value in Table 4-1.

4.1.2.4 *Calculation of the drinking water threat score for a watershed.* Multiply the drinking water threat factor category values for likelihood of release, waste characteristics, and targets for the watershed, and round the product to the nearest integer. Then divide by 82,500. Assign the resulting value, subject to a maximum of 100, as the drinking water threat score for the watershed. Enter this value in Table 4-1.

4.1.3 *Human food chain threat.* Evaluate the human food chain threat for each watershed based on three factor categories: likelihood of release, waste characteristics, and targets.

4.1.3.1 *Human food chain threat-likelihood of release.* Assign the same likelihood of release factor category value for the human food chain threat for the watershed as would be assigned in section 4.1.2.1.3 for the drinking water threat. Enter this value in Table 4-1.

4.1.3.2 *Human food chain threat-waste characteristics.* Evaluate the waste characteristics factor category for each watershed based on two factors: toxicity/persistence/bioaccumulation and hazardous waste quantity.

4.1.3.2.1 *Toxicity/persistence/bioaccumulation.* Evaluate all those hazardous substances eligible to be evaluated for toxicity/persistence in the drinking water threat for the watershed (see section 4.1.2.2).

4.1.3.2.1.1 *Toxicity.* Assign a toxicity factor value to each hazardous substance as specified in section 2.4.1.1.

4.1.3.2.1.2 *Persistence.* Assign a persistence factor value to each hazardous substance as specified for the drinking water threat (see section 4.1.2.2.1.2), except: use the predominant water category (that is, lakes; or rivers, oceans, coastal tidal waters, or Great Lakes) between the probable point of entry and the nearest fishery (not the nearest drinking water or resources intake) along the hazardous substance migration path for the watershed to determine which portion of Table 4-10 to use. Determine the predominant water category based on distance as specified in section 4.1.2.2.1.2. For contaminated sediments with no identified source, use the point where measurement begins rather than the probable point of entry.

4.1.3.2.1.3 *Bioaccumulation potential.* Use the following data hierarchy to assign a bioaccumulation potential factor value to each hazardous substance:

- Bioconcentration factor (BCF) data.
- Logarithm of the n-octanol-water partition coefficient (log K_{ow}) data.
- Water solubility data.

Assign a bioaccumulation potential factor value to each hazardous substance from Table 4-15.

If BCF data are available for any aquatic human food chain organism for the substance being evaluated, assign the bioaccumulation potential factor value to the hazardous substance as follows:

- If BCF data are available for both fresh water and salt water for the hazardous substance, use the BCF data that correspond to the type of water body (that is, fresh water or salt water) in which the fisheries are located to assign the bioaccumulation potential factor value to the hazardous substance.
- If, however, some of the fisheries being evaluated are in fresh water and some are in salt water, or if any are in brackish water, use the BCF data that yield the higher factor value to assign the bioaccumulation potential factor value to the hazardous substance.
- If BCF data are available for either fresh water or salt water, but not for both, use the available BCF data to assign the bioaccumulation potential factor value to the hazardous substance.

If BCF data are not available for the hazardous substance, use log K_{ow} data to assign a bioaccumulation potential factor value to organic substances, but not to inorganic substances. If BCF data are not available, and if either log K_{ow} data are not available, the log K_{ow} is available but exceeds 6.0, or the substance is an inorganic substance, use water solubility data to assign a bioaccumulation potential factor value.

TABLE 4-15.—BIOACCUMULATION POTENTIAL FACTOR VALUES [a]

If bioconcentration factor (BCF) data are available for any aquatic human food chain organism, assign a value as follows: [b]

BCF	Assigned value
Greater than or equal to 10,000	50,000
1,000 to less than 10,000	5,000
100 to less than 1,000	500
10 to less than 100	50
1 to less than 10	5
Less than 1	0.5

If BCF data are not available, and log K_{ow} data are available and do not exceed 6.0, assign a value to an organic hazardous substance as follows (for inorganic hazardous substances, skip this step and proceed to the next):

Log K_{ow}	Assigned value
5.5 to 6.0	50,000
4.5 to less than 5.5	5,000
3.2 to less than 4.5	500
2.0 to less than 3.2	50
0.8 to less than 2.0	5
Less than 0.8	0.5

If BCF data are not available, and if either Log K_{ow} data are not available, a log K_{ow} is available but exceeds 6.0, or the substance is an inorganic substance, assign a value as follows:

TABLE 4-15.—BIOACCUMULATION POTENTIAL FACTOR VALUES [a]—Concluded

Water solubility (mg/l)	Assigned value
Less than 25	50,000
25 to 500	5,000
Greater than 500 to 1,500	500
Greater than 1,500	0.5

If none of these data are available, assign a value of 0.5.

[a] Do not round to nearest integer.
[b] See text for use of freshwater and saltwater BCF data.

Do not distinguish between fresh water and salt water in assigning the bioaccumulation potential factor value based on log K_{ow} or water solubility data.

If none of these data are available, assign the hazardous substance's bioaccumulation potential factor value of 0.5.

4.1.3.2.1.4 *Calculation of toxicity/persistence/bioaccumulation factor value.* Assign each hazardous substance a toxicity/persistence factor value from Table 4-12, based on the values assigned to the hazardous substance for the toxicity and persistence factors. Then assign each hazardous substance a toxicity/persistence/bioaccumulation factor value from Table 4-16, based on the values assigned for the toxicity/persistence and bioaccumulation potential factors. Use the hazardous substance with the highest toxicity/persistence/bioaccumulation factor value for the watershed to assign the value to this factor. Enter this value in Table 4-1.

BILLING CODE 6560-50-M

TABLE 4-16
TOXICITY/PERSISTENCE/BIOACCUMULATION FACTOR VALUES[a]

Toxicity/ Persistence Factor Value	Bioaccumulation Potential Factor Value					
	50,000	5,000	500	50	5	0.5
10,000	5×10^8	5×10^7	5×10^6	5×10^5	5×10^4	5,000
4,000	2×10^8	2×10^7	2×10^6	2×10^5	2×10^4	2,000
1,000	5×10^7	5×10^6	5×10^5	5×10^4	5,000	500
700	3.5×10^7	3.5×10^6	3.5×10^5	3.5×10^4	3,500	350
400	2×10^7	2×10^6	2×10^5	2×10^4	2,000	200
100	5×10^6	5×10^5	5×10^4	5,000	500	50
70	3.5×10^6	3.5×10^5	3.5×10^4	3,500	350	35
40	2×10^6	2×10^5	2×10^4	2,000	200	20
10	5×10^5	5×10^4	5,000	500	50	5
7	3.5×10^5	3.5×10^4	3,500	350	35	3.5
4	2×10^5	2×10^4	2,000	200	20	2
1	5×10^4	5,000	500	50	5	0.5
0.7	3.5×10^4	3,500	350	35	3.5	0.35
0.4	2×10^4	2,000	200	20	2	0.2
0.07	3,500	350	35	3.5	0.35	0.035
0.007	350	35	3.5	0.35	0.035	0.0035
0.0007	35	3.5	0.35	0.035	0.0035	0.00035
0	0	0	0	0	0	0

[a]Do not round to nearest integer.

BILLING CODE 6560-50-C

4.1.3.2.2 *Hazardous waste quantity.* Assign the same factor value for hazardous waste quantity for the watershed as would be assigned in section 4.1.2.2.2 for the drinking water threat. Enter this value in Table 4-1.

4.1.3.2.3 *Calculation of human food chain threat-waste characteristics factor category value.* For the hazardous substance selected for the watershed in section 4.1.3.2.1.4, use its toxicity/persistence factor value and bioaccumulation potential factor value as follows to assign a value to the waste characteristics factor category. First, multiply the toxicity/persistence factor value and the hazardous waste quantity factor value for the watershed, subject to a maximum product of 1×10^{8}. Then multiply this product by the bioaccumulation potential factor value for this hazardous substance, subject to a maximum product of 1×10^{12}. Based on this second product, assign a value from Table 2-7 (section 2.4.3.1) to the human food chain threat-waste characteristics factor category for the watershed. Enter this value in Table 4-1.

4.1.3.3 *Human food chain threat-targets.* Evaluate two target factors for each watershed: food chain individual and population. For both factors, determine whether the target fisheries are subject to actual or potential human food chain contamination.

Consider a fishery (or portion of a fishery) within the target distance limit of the watershed to be subject to actual human food chain contamination if any of the following apply:

- A hazardous substance having a bioaccumulation potential factor value of 500 or greater is present either in an observed release by direct observation to the watershed or in a surface water or sediment sample from the watershed at a level that meets the criteria for an observed release to the watershed from the site, and at least a portion of the fishery is within the boundaries of the observed release (that is, it is located either at the point of direct observation or at or between the probable point of entry and the most distant sampling point establishing the observed release).
- The fishery is closed, and a hazardous substance for which the fishery has been closed has been documented in an observed release to the watershed from the site, and at least a portion of the fishery is within the boundaries of the observed release.
- A hazardous substance is present in a tissue sample from an essentially sessile, benthic, human food chain organism from the watershed at a level that meets the criteria for an observed release to the watershed from the site, and at least a portion of the fishery is within the boundaries of the observed release.

For a fishery that meets any of these three criteria, but that is not wholly within the boundaries of the observed release, consider only the portion of the fishery that is within the boundaries of the observed release to be subject to actual human food chain contamination. Consider the remainder of the fishery within the target distance limit to be subject to potential food chain contamination.

In addition, consider all other fisheries that are partially or wholly within the target distance limit for the watershed, including fisheries partially or wholly within the boundaries of an observed release for the watershed that do not meet any of the three criteria listed above, to be subject to potential human food chain contamination. If only a portion of the fishery is within the target distance limit for the watershed, include only that portion in evaluating the targets factor category.

When a fishery (or portion of a fishery) is subject to actual food chain contamination, determine the part of the fishery subject to Level I concentrations and the part subject to Level II concentrations. If the actual food chain contamination is based on direct observation, evaluate it using Level II concentrations. However, if the actual food chain contamination is based on samples from the watershed, use these samples and, if available, additional tissue samples from aquatic human food chain organisms as specified below, to determine the part subject to Level I concentrations and the part subject to Level II concentrations:

- Determine the level of actual contamination from samples (including tissue samples from essentially sessile, benthic organisms) that meet the criteria for actual food chain contamination by comparing the exposure concentrations (see section 4.1.2.3) from these samples (or comparable samples) to the health-based benchmarks from Table 4-17, as described in section 2.5.1 and 2.5.2. Use only the exposure concentrations for those hazardous substances in the sample (or comparable samples) that meet the criteria for actual contamination of the fishery.
- In addition, determine the level of actual contamination from other tissue samples by comparing the concentrations of hazardous substances in the tissue samples (or comparable tissue samples) to the health-based benchmarks from Table 4-17, as described in sections 2.5.1 and 2.5.2. Use only those additional tissue samples and only those hazardous substances in the tissue samples that meet all the following criteria:
  - The tissue sample is from a location that is within the boundaries of the actual food chain contamination for the site (that is, either at the point of direct observation or at or between the probable point of entry and the most distant sample point meeting the criteria for actual food chain contamination).
  - The tissue sample is from a species of aquatic human food chain organism that spends extended periods of time within the boundaries of the actual food chain contamination for the site and that is not an essentially sessile, benthic organism.
  - The hazardous substance is a substance that is also present in a surface water, benthic, or sediment sample from within the target distance limit for the watershed and, for such a sample, meets the criteria for actual food chain contamination.

TABLE 4-17.—HEALTH-BASED BENCHMARKS FOR HAZARDOUS SUBSTANCES IN HUMAN FOOD CHAIN

- Concentration corresponding to Food and Drug Administration Action Level (FDAAL) for fish or shellfish.
- Screening concentration for cancer corresponding to that concentration that corresponds to the 10^{-6} individual cancer risk for oral exposures.
- Screening concentration for noncancer toxicological responses corresponding to the Reference Dose (RfD) for oral exposures.

4.1.3.3.1 *Food chain individual.* Evaluate the food chain individual factor based on the fisheries (or portions of fisheries) within the target distance limit for the watershed. Assign this factor a value as follows:

- If any fishery (or portion of a fishery) is subject to Level I concentrations, assign a value of 50.
- If not, but if any fishery (or portion of a fishery) is subject to Level II concentrations, assign a value of 45.
- If not, but if there is an observed release of a hazardous substance having a bioaccumulation potential factor value of 500 or greater to surface water in the watershed and there is a fishery (or portion of a fishery) present anywhere within the target distance limit, assign a value of 20.
- If there is no observed release to surface water in the watershed or there is no observed release of a hazardous substance having a bioaccumulation potential factor value of 500 or greater, but there is a fishery (or portion of a fishery) present anywhere within the target distance limit, assign a value as follows:
  - Using Table 4-13, determine the highest dilution weight (that is, lowest amount of dilution) applicable to the fisheries (or portions of fisheries) within the target distance limit. Multiply this dilution weight by 20 and round to the nearest integer.
  - Assign this calculated value as the factor value.
- If there are no fisheries (or portions of fisheries) within the target distance limit of the watershed, assign a value of 0.

Enter the value assigned in Table 4-1.

4.1.3.3.2 *Population.* Evaluate the population factor for the watershed based on three factors: Level I concentrations, Level II concentrations, and potential human food chain contamination. Determine which factor applies for a fishery (or portion of a fishery) as specified in section 4.1.3.3.

4.1.3.3.2.1 *Level I concentrations.* Determine those fisheries (or portions of fisheries) within the watershed that are subject to Level I concentrations.

Estimate the human food chain population value for each fishery (or portion of a fishery) as follows:

- Estimate human food chain production for the fishery based on the estimated annual production (in pounds) of human food chain organisms (for example, fish, shellfish) for that fishery, except: if the fishery is closed and a hazardous substance for which the fishery has been closed has been documented in an observed release to the fishery from a source at the site, use the estimated annual production for the period prior to closure of the fishery or use the estimated annual production from comparable fisheries that are not closed.

- Assign the fishery a value for human food chain population from Table 4-18, based on the estimated human food production for the fishery.
- Set boundaries between fisheries at those points where human food chain production changes or where the surface water dilution weight changes.

Sum the human food chain population value for each fishery (and portion of a fishery). Multiply this sum by 10. If the product is less than 1, do not round it to the nearest integer; if 1 or more, round to the nearest integer. Assign the resulting value as the Level I concentrations factor value. Enter this value in Table 4-1.

4.1.3.3.2.2 *Level II concentrations.* Determine those fisheries (or portions of fisheries) within the watershed that are subject to Level II concentrations. Do not include any fisheries (or portions of fisheries) already counted under the Level I concentrations factor.

Assign each fishery (or portion of a fishery) a value for human food chain population from Table 4-18, based on the estimated human food production for the fishery. Estimate the human food chain production for the fishery as specified in section 4.1.3.3.2.1.

Sum the human food chain population value for each fishery (and portion of a fishery). If this sum is less than 1, do not round it to the nearest integer; if 1 or more, round to the nearest integer. Assign the resulting value as the Level II concentrations factor value. Enter this value in Table 4-1.

TABLE 4-18.—HUMAN FOOD CHAIN POPULATION VALUES [a]

Human food chain production (pounds per year)	Assigned human food chain population value
0	0
Greater than 0 to 100	0.03
Greater than 100 to 1,000	0.3
Greater than 1,000 to 10,000	3
Greater than 10,000 to 100,000	31
Greater than 100,000 to 1,000,000	310
Greater than 10^6 to 10^7	3,100
Greater than 10^7 to 10^8	31,000
Greater than 10^8 to 10^9	310,000
Greater than 10^9	3,100,000

[a] Do not round to nearest integer.

4.1.3.3.2.3 *Potential human food chain contamination.* Determine those fisheries (or portions of fisheries) within the watershed that are subject to potential human food chain contamination. Do not include those fisheries (or portion of fisheries) already counted under the Level I or Level II concentrations factors.

Calculate the value for the potential human food chain contamination factor (PF) for the watershed as follows:

$$PF = \frac{1}{10} \sum_{i=1}^{n} P_i D_i$$

where:

P_i = Human food chain population value for fishery i.

D_i = Dilution weight from Table 4-13 for fishery i.

n = Number of fisheries subject to potential human food chain contamination.

In calculating PF:

- Estimate the human food chain population value (P_i) for a fishery (or portion of a fishery) as specified in section 4.1.3.3.2.1.
- Assign the fishery (or portion of a fishery) a dilution weight as indicated in Table 4-13 (section 4.1.2.3.1), except: do not assign a dilution weight of 0.5 for a "3-mile mixing zone in quiet flowing river"; instead assign a dilution weight based on the average annual flow.

If PF is less than 1, do not round it to the nearest integer; if PF is 1 or more, round to the nearest integer. Enter the value assigned in Table 4-1.

4.1.3.3.2.4 *Calculation of population factor value.* Sum the values for the Level I concentrations, Level II concentrations, and potential human food chain contamination factors for the watershed. Do not round this sum to the nearest integer. Assign it as the population factor value for the watershed. Enter this value in Table 4-1.

4.1.3.3.3 *Calculation of human food chain threat-targets factor category value.* Sum the food chain individual and population factor values for the watershed. Do not round this sum to the nearest integer. Assign it as the human food chain threat-targets factor category value for the watershed. Enter this value in Table 4-1.

4.1.3.4 *Calculation of human food chain threat score for a watershed.* Multiply the human food chain threat factor category values for likelihood of release, waste characteristics, and targets for the watershed, and round the product to the nearest integer. Then divide by 82,500. Assign the resulting value, subject to a maximum of 100, as the human food chain threat score for the watershed. Enter this score in Table 4-1.

4.1.4 *Environmental threat.* Evaluate the environmental threat for the watershed based on three factor categories: likelihood of release, waste characteristics, and targets.

4.1.4.1 *Environmental threat-likelihood of release.* Assign the same likelihood of release factor category value for the environmental threat for the watershed as would be assigned in section 4.1.2.1.3 for the drinking water threat. Enter this value in Table 4-1.

4.1.4.2 *Environmental threat-waste characteristics.* Evaluate the waste characteristics factor category for each watershed based on two factors: ecosystem toxicity/persistence/bioaccumulation and hazardous waste quantity.

4.1.4.2.1 *Ecosystem toxicity/persistence/bioaccumulation.* Evaluate all those hazardous substances eligible to be evaluated for toxicity/persistence in the drinking water threat for the watershed (see section 4.1.2.2).

4.1.4.2.1.1 *Ecosystem toxicity.* Assign an ecosystem toxicity factor value from Table 4-19 to each hazardous substance on the basis of the following data hierarchy:

- EPA chronic Ambient Water Quality Criterion (AWQC) for the substance.
- EPA chronic Ambient Aquatic Life Advisory Concentrations (AALAC) for the substance.
- EPA acute AWQC for the substance.
- EPA acute AALAC for the substance.
- Lowest LC_{50} value for the substance.

In assigning the ecosystem toxicity factor value to the hazardous substance:

- If either an EPA chronic AWQC or AALAC is available for the hazardous substance, use it to assign the ecosystem toxicity factor value. Use the chronic AWQC in preference to the chronic AALAC when both are available.
- If neither is available, use the EPA acute AWQC or AALAC to assign the ecosystem toxicity factor value. Use the acute AWQC in preference to the acute AALAC.
- If none of the chronic and acute AWQCs and AALACs is available, use the lowest LC_{50} value to assign the ecosystem toxicity factor value.
- If an LC_{50} value is also not available, assign an ecosystem toxicity factor value of 0 to the hazardous substance and use other hazardous substances for which data are available in evaluating the pathway.

If an ecosystem toxicity factor value of 0 is assigned to all hazardous substances eligible to be evaluated for the watershed (that is, insufficient data are available for evaluating all the substances), use a default value of 100 as the ecosystem toxicity factor value for all these hazardous substances.

With regard to the AWQC, AALAC, or LC_{50} selected for assigning the ecosystem toxicity factor value to the hazardous substance:

- If values for the selected AWQC, AALAC, or LC_{50} are available for both fresh water and marine water for the hazardous substance, use the value that corresponds to the type of water body (that is, fresh water or salt water) in which the sensitive environments are located to assign the ecosystem toxicity factor value to the hazardous substance.
- If, however, some of the sensitive environments being evaluated are in fresh water and some are in salt water, or if any are in brackish water, use the value (fresh water or marine) that yields the higher factor value to assign the ecosystem toxicity factor value to the hazardous substance.
- If a value for the selected AWQC, AALAC, or LC_{50} is available for either fresh water or marine water, but not for both, use the available one to assign an ecosystem toxicity factor value to the hazardous substance.

TABLE 4-19.—ECOSYSTEM TOXICITY FACTOR VALUES

If an EPA chronic AWQC[a] or AALAC[b] is available, assign a value as follows:[c]

EPA chronic AWQC or AALAC	Assigned value
Less than 1 μg/l	10,000
1 to 10 μg/l	1,000
Greater than 10 to 100 μg/l	100
Greater than 100 to 1,000 μg/l	10
Greater than 1,000 μg/l	1

If neither an EPA chronic AWQC nor EPA chronic AALAC is available, assign a value based on the EPA acute AWQC or AALAC as follows:[c]

EPA acute AWQC or AALAC	Assigned value
Less than 100 μg/l	10,000
100 to 1,000 μg/l	1,000
Greater than 1,000 to 10,000 μg/l	100
Greater than 10,000 to 100,000 μg/l	10
Greater than 100,000 μg/l	1

TABLE 4-19. ECOSYSTEM TOXICITY FACTOR VALUES—Concluded

If neither an EPA chronic or acute AWQC nor EPA chronic or acute AALAC is available, assign a value from the LC_{50} as follows:

EPA acute AWQC or AALAC

LC_{50}	Assigned value
Less than 100 μg/l	10,000
100 to 1,000 μg/l	1,000
Greater than 1,000 to 10,000 μg/l	100
Greater than 10,000 to 100,000 μg/l	10
Greater than 100,000 μg/l	1

If none of the AWQCs and AALACs nor the LC_{50} is available, assign a value of 0.

[a] AWQC—Ambient Water Quality Criteria.
[b] AALAC—Ambient Aquatic Life Advisory Concentrations.
[c] Use the AWQC value in preference to the AALAC when both are available. See text for use of freshwater and marine values.

4.1.4.2.1.2 *Persistence.* Assign a persistence factor value to each hazardous substance as specified in section 4.1.2.2.1.2, except: use the predominant water category (that is lakes; or rivers, oceans, coastal tidal waters, or Great Lakes) between the probable point of entry and the nearest sensitive environment (not the nearest drinking water or resources intake) along the hazardous substance migration path for the watershed to determine which portion of Table 4-20 to use. Determine the predominant water category based on distance as specified in section 4.1.2.2.1.2. For contaminated sediments with no identified source, use the point where measurement begins rather than the probable point of entry.

4.1.4.2.1.3 *Ecosystem bioaccumulation potential.* Assign an ecosystem bioaccumulation potential factor value to each hazardous substance in the same manner specified for the bioaccumulation potential factor in section 4.1.3.2.1.3, except:

• Use BCF data for all aquatic organisms, not just for aquatic human food chain organisms.

• Use the BCF data that corresponds to the type of water body (that is, fresh water or salt water) in which the sensitive environments (not fisheries) are located.

4.1.4.2.1.4 *Calculation of ecosystem toxicity/persistence/bioaccumulation factor value.* Assign each hazardous substance an ecosystem toxicity/persistence factor value from Table 4-20, based on the values assigned to the hazardous substance for the ecosystem toxicity and persistence factors. Then assign each hazardous substance an ecosystem toxicity/persistence/bioaccumulation factor value from Table 4-21, based on the values assigned for the ecosystem toxicity/persistence and ecosystem bioaccumulation potential factors. Select the hazardous substance with the highest ecosystem toxicity/persistence/bioaccumulation factor value for the watershed and use it to assign the value to this factor. Enter this value in Table 4-1.

TABLE 4-20.—ECOSYSTEM TOXICITY/PERSISTENCE FACTOR VALUES[a]

Persistence factor value	Ecosystem toxicity factor value					
	10,000	1,000	100	10	1	0
1.0	10,000	1,000	100	10	1	0
0.4	4,000	400	40	4	0.4	0
0.07	700	70	7	0.7	0.07	0
0.0007	7	0.7	0.07	0.007	0.0007	0

[a] Do not round to nearest integer.

BILLING CODE 6560-50-M

TABLE 4-21
ECOSYSTEM TOXICITY/PERSISTENCE/BIOACCUMULATION FACTOR VALUES[a]

Ecosystem Toxicity/ Persistence Factor Value	Ecosystem Bioaccumulation Potential Factor Value					
	50,000	5,000	500	50	5	0.5
10,000	5×10^8	5×10^7	5×10^6	5×10^5	5×10^4	5,000
4,000	2×10^8	2×10^7	2×10^6	2×10^5	2×10^4	2,000
1,000	5×10^7	5×10^6	5×10^5	5×10^4	5,000	500
700	3.5×10^7	3.5×10^6	3.5×10^5	3.5×10^4	3,500	350
400	2×10^7	2×10^6	2×10^5	2×10^4	2,000	200
100	5×10^6	5×10^5	5×10^4	5,000	500	50
70	3.5×10^6	3.5×10^5	3.5×10^4	3,500	350	35
40	2×10^6	2×10^5	2×10^4	2,000	200	20
10	5×10^5	5×10^4	5,000	500	50	5
7	3.5×10^5	3.5×10^4	3,500	350	35	3.5
4	2×10^5	2×10^4	2,000	200	20	2
1	5×10^4	5,000	500	50	5	0.5
0.7	3.5×10^4	3,500	350	35	3.5	0.35
0.4	2×10^4	2,000	200	20	2	0.2
0.07	3,500	350	35	3.5	0.35	0.035
0.007	350	35	3.5	0.35	0.035	0.0035
0.0007	35	3.5	0.35	0.035	0.0035	0.00035
0	0	0	0	0	0	0

[a]Do not round to nearest integer.

BILLING CODE 6560-50-C

4.1.4.2.2 *Hazardous waste quantity.* Assign the same factor value for hazardous waste quantity for the watershed as would be assigned in section 4.1.2.2.2 for the drinking water threat. Enter this value in Table 4-1.

4.1.4.2.3 *Calculation of environmental threat-waste characteristics factor category value.* For the hazardous substance selected for the watershed in section 4.1.4.2.1.4, use its ecosystem toxicity/persistence factor value and ecosystem bioaccumulation potential factor value as follows to assign a value to the waste characteristics factor category. First, multiply the ecosystem toxicity/persistence factor value and the hazardous waste quantity factor value for the watershed, subject to a maximum product of 1×10^8. Then multiply this product by the ecosystem bioaccumulation potential factor value for this hazardous substance, subject to a maximum product of 1×10^{12}. Based on this second product, assign a value from Table 2-7 (section 2.4.3.1) to the environmental threat-waste characteristics factor category for the watershed. Enter this value in Table 4-1.

TABLE 4-22.—ECOLOGICAL-BASED BENCHMARKS FOR HAZARDOUS SUBSTANCES IN SURFACE WATER

• Concentration corresponding to EPA Ambient Water Quality Criteria (AWQC) for protection of aquatic life (fresh water or marine).

• Concentration corresponding to EPA Ambient Aquatic Life Advisory Concentrations (AALAC).

• Select the appropriate AWQC and AALAC as follows:

–Use chronic value, if available; otherwise use acute value.

–If the sensitive environment being evaluated is in fresh water, use fresh water value, except: if no fresh water value is available, use marine value if available.

–If the sensitive environment being evaluated is in salt water, use marine value, except: if no marine value is available, use fresh water value if available.

–If the sensitive environment being evaluated is in both fresh water and salt water, or is in brackish water, use lower of fresh water or marine values.

TABLE 4-23.—SENSITIVE ENVIRONMENTS RATING VALUES

Sensitive environment	Assigned value
Critical habitat [a] for Federal designated endangered or threatened species	100
Marine Sanctuary	
National Park	
Designated Federal Wilderness Area	
Areas identified under Coastal Zone Management Act [b]	
Sensitive areas identified under National Estuary Program [c] or Near Coastal Waters Program [d]	
Critical areas identified under the Clean Lakes Program [e]	
National Monument [f]	
National Seashore Recreational Area	
National Lakeshore Recreational Area	
Habitat known to be used by Federal designated or proposed endangered or threatened species	75
National Preserve	
National or State Wildlife Refuge	
Unit of Coastal Barrier Resources System	
Coastal Barrier (undeveloped)	
Federal land designated for protection of natural ecosystems	
Administratively Proposed Federal Wilderness Area	
Spawning areas critical [g] for the maintenance of fish/shellfish species within river, lake, or coastal tidal waters	
Migratory pathways and feeding areas critical for maintenance of anadromous fish species within river reaches or areas in lakes or coastal tidal waters in which the fish spend extended periods of time	
Terrestrial areas utilized for breeding by large or dense aggregations of animals [h]	
National river reach designated as Recreational	
Habitat known to be used by State designated endangered or threatened species	50
Habitat known to be used by species under review as to its Federal endangered or threatened status	
Coastal Barrier (partially developed)	
Federal designated Scenic or Wild River	
State land designated for wildlife or game management	25
State designated Scenic or Wild River	
State designated Natural Areas	
Particular areas, relatively small in size, important to maintenance of unique biotic communities	
State designated areas for protection or maintenance of aquatic life [i]	5

[a] Critical habitat as defined in 50 CFR 424.02.

[b] Areas identified in State Coastal Zone Management plans as requiring protection because of ecological value.

[c] National Estuary Program study areas (subareas within estuaries) identified in Comprehensive Conservation and Management Plans as requiring protection because they support critical life stages of key estuarine species (Section 320 of Clean Water Act, as amended).

[d] Near Coastal Waters as defined in Sections 104(b)(3), 304(1), 319, and 320 of Clean Water Act, as amended.

[e] Clean Lakes Program critical areas (subareas within lakes, or in some cases entire small lakes) identified by State Clean Lake Plans as critical habitat (Section 314 of Clean Water Act, as amended).

[f] Use only for air migration pathway.

[g] Limit to areas described as being used for intense or concentrated spawning by a given species.

[h] For the air migration pathway, limit to terrestrial vertebrate species. For the surface water migration pathway, limit to terrestrial vertebrate species with aquatic or semiaquatic foraging habits.

[i] Areas designated under Section 305(a) of Clean Water Act, as amended.

TABLE 4–24.—WETLANDS RATING VALUES FOR SURFACE WATER MIGRATION PATHWAY

Total length of wetlands[a] (miles)	Assigned value
Less than 0.1	0
0.1 to 1	25
Greater than 1 to 2	50
Greater than 2 to 3	75
Greater than 3 to 4	100
Greater than 4 to 8	150
Greater than 8 to 12	250
Greater than 12 to 16	350
Greater than 16 to 20	450
Greater than 20	500

[a] Wetlands as defined in 40 CFR Section 230.3.

4.1.4.3 *Environmental threat-targets.* Evaluate the environmental threat-targets factor category for a watershed using one factor: sensitive environments.

4.1.4.3.1 *Sensitive environments.* Evaluate sensitive environments along the hazardous substance migration path for the watershed based on three factors: Level I concentrations, Level II concentrations, and potential contamination.

Determine which factor applies to each sensitive environment as specified in section 4.1.2.3, except: use ecological-based benchmarks (Table 4–22) rather than health-based benchmarks (Table 3–10) in determining the level of contamination from samples. In determining the level of actual contamination, use a point of direct observation anywhere within the sensitive environment or samples (that is, surface water, benthic, or sediment samples) taken anywhere within or beyond the sensitive environment (or anywhere adjacent to or beyond the sensitive environment if it is contiguous to the migration path).

4.1.4.3.1.1 *Level I concentrations.* Assign value(s) from Table 4–23 to each sensitive environment subject to Level I concentrations.

For those sensitive environments that are wetlands, assign an additional value from Table 4–24. In assigning a value from Table 4–24, include only those portions of wetlands located along the hazardous substance migration path in the area of Level I concentrations. If a wetland is located partially along the area of Level I concentrations and partially along the area of Level II concentrations and/or potential contamination, then solely for purposes of Table 4–24, count the portion(s) along the areas of Level II concentrations or potential contamination under the Level II concentrations factor (section 4.1.4.3.1.2) or potential contamination factor (section 4.1.4.3.1.3), as appropriate.

Estimate the total length of wetlands along the hazardous substance migration path (that is, wetland frontage) in the area of Level I concentrations and assign a value from Table 4–24 based on this total length. Estimate this length as follows:

• For an isolated wetland or for a wetland where the probable point of entry to surface water is in the wetland, use the perimeter of that portion of the wetland subject to Level I concentrations as the length.

• For rivers, use the length of the wetlands contiguous to the in-water segment of the hazardous substance migration path (that is, wetland frontage).

• For lakes, oceans, coastal tidal waters, and Great Lakes, use the length of the wetlands along the shoreline within the target distance limit (that is, wetland frontage along the shoreline).

Calculate the Level I concentrations factor value (SH) for the watershed as follows:

$$SH = 10\left(WH + \sum_{i=1}^{n} S_i\right)$$

where:

WH = Value assigned from Table 4–24 to wetlands along the area of Level I concentrations.

S_i = Value(s) assigned from Table 4–23 to sensitive environment i.

n = Number of sensitive environments from Table 4–23 subject to Level I concentrations.

Enter the value assigned in Table 4–1.

4.1.4.3.1.2 *Level II concentrations.* Assign value(s) from Table 4–23 to each sensitive environment subject to Level II concentrations. Do not include sensitive environments already counted for Table 4–23 under the Level I concentrations factor for this watershed.

For those sensitive environments that are wetlands, assign an additional value from Table 4–24. In assigning a value from Table 4–24, include only those portions of wetlands located along the hazardous substance migration path in the area of Level II concentrations, as specified in section 4.1.4.3.1.1.

Estimate the total length of wetlands along the hazardous substance migration path (that is, wetland frontage) in the area of Level II concentrations and assign a value from Table 4–24 based on this total length. Estimate this length as specified in section 4.1.4.3.1.1, except: for an isolated wetland or for a wetland where the probable point of entry to surface water is in the wetland, use the perimeter of that portion of the wetland subject to Level II (not Level I) concentrations as the length.

Calculate the Level II concentrations value (SL) for the watershed as follows:

$$SL = WL + \sum_{i=1}^{n} S_i$$

where:

WL = Value assigned from Table 4–24 to wetlands along the area of Level II concentrations.

S_i = Value(s) assigned from Table 4–23 to sensitive environment i.

n = Number of sensitive environments from Table 4–23 subject to Level II concentrations.

Enter the value assigned in Table 4–1.

4.1.4.3.1.3 *Potential contamination.* Assign value(s) from Table 4–23 to each sensitive environment subject to potential contamination. Do not include sensitive environments already counted for Table 4–23 under the Level I or Level II concentrations factors.

For each type of surface water body in Table 4–13 (section 4.1.2.3.1), sum the value(s) assigned from Table 4–23 to the sensitive environments along that type of surface water body, except: do not use the surface water body type "3-mile mixing zone in quiet flowing river." If a sensitive environment is along two or more types of surface water bodies (for example, Wildlife Refuge contiguous to both a moderate stream and a large river), assign the sensitive environment only to that surface water body type having the highest dilution weight value from Table 4–13.

For those sensitive environments that are wetlands, assign an additional value from Table 4–24. In assigning a value from Table 4–24, include only those portions of wetlands located along the hazardous substance migration path in the area of potential contamination, as specified in section 4.1.4.3.1.1. Aggregate these wetlands by type of surface water body, except: do not use the surface water body type "3-mile mixing zone in quiet flowing river." Treat the wetlands aggregated within each type of surface water body as separate sensitive environments solely for purposes of applying Table 4–24. Estimate the total length of the wetlands within each surface water body type as specified in section 4.1.4.3.1.1, except: for an isolated wetland or for a wetland where the probable point of entry to surface water is in the wetland, use the perimeter of that portion of the wetland subject to potential contamination (or the portion of that perimeter that is within the target distance limit) as the length. Assign a separate value from Table 4–24 for each type of surface water body in the watershed.

Calculate the potential contamination factor value (SP) for the watershed as follows:

$$SP = \frac{1}{10} \sum_{j=1}^{m} \left[(W_j + S_j)D_j\right]$$

where:

$$S_j = \sum_{i=1}^{n} S_{ij}$$

S_{ij} = Value(s) assigned from Table 4–23 to sensitive environment i in surface water body type j.

n = Number of sensitive environments from Table 4–23 subject to potential contamination.

W_j = Value assigned from Table 4–24 for wetlands along the area of potential contamination in surface water body type j.

D_j = Dilution weight from Table 4–13 for surface water body type j.

m = Number of different surface water body types from Table 4–13 in the watershed.

If SP is less than 1, do not round it to the nearest integer; if SP is 1 or more, round to the nearest integer. Enter this value for the potential contamination factor in Table 4–1.

4.1.4.3.1.4 *Calculation of environmental threat-targets factor category value.* Sum the values for the Level I concentrations, Level II concentrations, and potential contamination factors for the watershed. Do not round this sum to the nearest integer. Assign this sum as the environmental threat-targets factor category value for the watershed. Enter this value in Table 4-1.

4.1.4.4 *Calculation of environmental threat score for a watershed.* Multiply the environmental threat factor category values for likelihood of release, waste characteristics, and targets for the watershed, and round the product to the nearest integer. Then divide by 82,500. Assign the resulting value, subject to a maximum of 60, as the environmental threat score for the watershed. Enter this score in Table 4-1.

4.1.5 *Calculation of overland/flood migration component score for a watershed.* Sum the scores for the three threats for the watershed (that is, drinking water, human food chain, and environmental threats). Assign the resulting score, subject to a maximum value of 100, as the surface water overland/flood migration component score for the watershed. Enter this score in Table 4-1.

4.1.6 *Calculation of overland/flood migration component score.* Select the highest surface water overland/flood migration component score from the watersheds evaluated. Assign this score as the surface water overland/flood migration component score for the site, subject to a maximum score of 100. Enter this score in Table 4-1.

4.2 *Ground water to surface water migration component.* Use the ground water to surface water migration component to evaluate surface water threats that result from migration of hazardous substances from a source at the site to surface water via ground water. Evaluate three types of threats for this component: drinking water threat, human food chain threat, and environmental threat.

4.2.1 *General considerations.*

4.2.1.1 *Eligible surface waters.* Calculate ground water to surface water migration component scores only for surface waters (see section 4.0.2) for which all the following conditions are met:

- A portion of the surface water is within 1 mile of one or more sources at the site having a containment factor value greater than 0 (see section 4.2.2.1.2).
- No aquifer discontinuity is established between the source and the portion of the surface water within 1 mile of the source (see section 3.0.1.2.2). However, if hazardous substances have migrated across an apparent discontinuity within this 1 mile distance, do not consider a discontinuity present in scoring the site.
- The top of the uppermost aquifer is at or above the bottom of the surface water.

Do not evaluate this component for sites consisting solely of contaminated sediments with no identified source.

4.2.1.2 *Definition of hazardous substance migration path for ground water to surface water migration component.* The hazardous substance migration path includes both the ground water segment and the surface water in-water segment that hazardous substances would take as they migrate away from sources at the site:

- Restrict the ground water segment to migration via the uppermost aquifer between a source and the surface water.
- Begin the surface water in-water segment at the probable point of entry from the uppermost aquifer to the surface water. Identify the probable point of entry as that point of the surface water that yields the shortest straight-line distance, within the aquifer boundary (see section 3.0.1.2), from the sources at the site with a containment factor value greater than 0 to the surface water.
  - —For rivers, continue the in-water segment in the direction of flow (including any tidal flows) for the distance established by the target distance limit (see section 4.2.1.4).
  - —For lakes, oceans, coastal tidal waters, or Great Lakes, do not consider flow direction. Instead apply the target distance limit as an arc.
  - —If the in-water segment includes both rivers and lakes (or oceans, coastal tidal waters, or Great Lakes), apply the target distance limit to their combined in-water segments.

Consider a site to be in two or more watersheds for this component if two or more hazardous substance migration paths from the sources at the site do not reach a common point within the target distance limit. If the site is in more than one watershed, define a separate hazardous substance migration path for each watershed. Evaluate the ground water to surface water migration component for each watershed separately as specified in section 4.2.1.5.

4.2.1.3 *Observed release of a specific hazardous substance to surface water in-water segment.* Section 4.2.2.1.1 specifies the criteria for assigning values to the observed release factor for the ground water to surface water migration component. With regard to an individual hazardous substance, consider an observed release of that hazardous substance to be established for the surface water in-water segment of the ground water to surface water migration component only when the hazardous substance meets the criteria both for an observed release both to ground water (see section 4.2.2.1.1) and for an observed release by chemical analysis to surface water (see section 4.1.2.1.1).

If the hazardous substance meets the section 4.1.2.1.1 criteria for an observed release by chemical analysis to surface water but does not also meet the criteria for an observed release to ground water, do not use any samples of that hazardous substance from the surface water in-water segment in evaluating the factors of this component (for example, do not use the hazardous substance in establishing targets subject to actual contamination or in determining the level of actual contamination for a target).

4.2.1.4 *Target distance limit.* Determine the target distance limit for each watershed as specified in section 4.1.1.2, except: do not extend the target distance limit to a sample location beyond 15 miles unless at least one hazardous substance in a sample from that location meets the criteria in section 4.2.1.3 for an observed release to the surface water in-water segment.

Determine the targets eligible to be evaluated for each watershed and establish whether these targets are subject to actual or potential contamination as specified in section 4.1.1.2, except: do not establish actual contamination based on a sample location unless at least one hazardous substance in a sample from that location meets the criteria in section 4.2.1.3 for an observed release to the surface water in-water segment.

4.2.1.5 *Evaluation of ground water to surface water migration component.* Evaluate the drinking water threat, human food chain threat, and environmental threat for each watershed for this component based on three factor categories: likelihood of release, waste characteristics, and targets. Figure 4-2 indicates the factors included within each factor category for each type of threat.

BILLING CODE 6560-50-M

Likelihood of Release (LR)

Observed Release
or
Potential to Release
• Containment
• Net Precipitation
• Depth to Aquifer
• Travel Time

X

Drinking Water

Waste Characteristics (WC)

Toxicity/Mobility/Persistence
• Toxicity
  - Chronic
  - Carcinogenic
  - Acute
• Mobility
  - Water Solubility
  - Distribution Coefficient (K_d)
• Persistence
  - Half-life
  - K_{ow}

Hazardous Waste Quantity
• Hazardous Constituent Quantity
• Hazardous Wastestream Quantity
• Volume
• Area

X

Target (T)

Nearest Intake
Population
• Level I Concentrations
• Level II Concentrations
• Potential Contamination
Resources

Human Food Chain

Waste Characteristics (WC)

Toxicity/Mobility/Persistence/Bioaccumulation
• Toxicity
  - Chronic
  - Carcinogenic
  - Acute
• Mobility
  - Water Solubility
  - Distribution Coefficient (K_d)
• Persistence
  - Half-life
  - K_{ow}
• Bioaccumulation Potential

Hazardous Waste Quantity
• Hazardous Constituent Quantity
• Hazardous Wastestream Quantity
• Volume
• Area

X

Targets (T)

Food Chain Individual
Population
• Level I Concentrations
  - Human Food Chain Production
• Level II Concentrations
  - Human Food Chain Production
• Potential Human Food Chain Contamination
  - Human Food Chain Production

Environmental

Waste Characteristics (WC)

Ecosystem Toxicity/Mobility/Persistence/Bioaccumulation
• Ecosystem Toxicity
  - Ambient Water Quality Criteria
  - Ambient Aquatic Life Advisory Concentrations
• Mobility
  - Water Solubility
  - Distribution Coefficient (K_d)
• Persistence
  - Half-life
  - K_{ow}
• Ecosystem Bioaccumulation Potential

Hazardous Waste Quantity
• Hazardous Wastestream Quantity
• Hazardous Constitutent Quantity
• Volume
• Area

X

Targets (T)

Sensitive Environments
• Level I Concentrations
• Level II Concentrations
• Potential Contamination

Figure 4-2
OVERVIEW OF GROUND WATER TO SURFACE WATER MIGRATION COMPONENT

LING 60-50-C

Determine the ground water to surface water migration component score (S_{gs}) for a watershed in terms of the factor category values as follows:

$$S_{gs}=\frac{\sum_{i=1}^{3}(LR_i)(WC_i)(T_i)}{SF}$$

where:

LR_i=Likelihood of release factor category value for threat i (that is, drinking water, human food chain, or environmental threat).

WC_i=Waste characteristics factor category value for threat i.

T_i=Targets factor category value for threat i.

SF=Scaling factor.

Table 4-25 outlines the specific calculation procedure.

If the site is in only one watershed, assign the ground water to surface water migration component score for that watershed as the ground water to surface water migration component score for the site.

If the site is in more than one watershed:

- Calculate a separate ground water to surface water migration component score for each watershed, using likelihood of release, waste characteristics, and targets applicable to each watershed.
- Select the highest ground water to surface water migration component score from the watersheds evaluated and assign it as the ground water to surface water migration component score for the site.

TABLE 4-25.—GROUND WATER TO SURFACE WATER MIGRATION COMPONENT SCORESHEET

Factor categories and factors	Maximum value	Value assigned
Drinking Water Threat		
Likelihood of Release to Aquifer:		
1. Observed Release	550	
2. Potential to Release:		
2a. Containment	10	
2b. Net Precipitation	10	
2c. Depth to Aquifer	5	
2d. Travel Time	35	
2e. Potential to Release (lines 2a(2b+2c+2d))	500	
3. Likelihood of Release (higher of lines 1 and 2e)	550	
Waste Characteristics:		
4. Toxicity/Mobility/Persistence	(a)	
5. Hazardous Waste Quantity	(a)	
6. Waste Characteristics	100	
Targets:		
7. Nearest Intake	50	
8. Population		
8a. Level I Concentrations	(b)	
8b. Level II Concentrations	(b)	
8c. Potential Contamination	(b)	
8d. Population (lines 8a + 8b + 8c)	(b)	
9. Resources	5	
10. Targets (lines 7 + 8d + 9)	(b)	
Drinking Water Threat Score:		
11. Drinking Water Threat Score ([lines 3 x 6 x 10]/82,500, subject to a maximum of 100)	100	
Human Food Chain Threat		
Likelihood of Release:		
12. Likelihood of Release (same value as line 3)	550	
Waste Characteristics:		
13. Toxicity/Mobility/Persistence/Bioaccumulation	(a)	
14. Hazardous Waste Quantity	(a)	
15. Waste Characteristics	1,000	
Targets:		
16. Food Chain Individual	50	
17. Population:		
17a. Level I Concentrations	(b)	
17b. Level II Concentrations	(b)	
17c. Potential Human Food Chain Contamination	(b)	
17d. Population (lines 17a + 17b + 17c)	(b)	
18. Targets (Lines 16 + 17d)	(b)	
Human Food Chain Threat Score:		
19. Human Food Chain Threat Score ([lines 12 x 15 x 18]/82,500, subject to a maximum of 100)	100	
Environmental Threat		
Likelihood of Release:		
20. Likelihood of Release (same value as line 3)	550	
Waste Characteristics:		
21 Ecosystem Toxicity/Mobility/Persistence/Bioaccumulation	(a)	
22. Hazardous Waste Quantity	(a)	
23. Waste Characteristics	1,000	
Targets:		
24. Sensitive Environments:		
24a. Level I Concentrations	(b)	
24b. Level II Concentrations	(b)	
24c. Potential Contamination	(b)	
24d. Sensitive Environments (lines 24a + 24b + 24c)	(b)	
25. Targets (value from line 24d)	(b)	

TABLE 4-25.—GROUND WATER TO SURFACE WATER MIGRATION COMPONENT SCORESHEET—Continued

Factor categories and factors	Maximum value	Value assigned
Environmental Threat Score:		
26. Environmental Threat Score ([lines 20 x 23 x 25]/82,500, subject to a maximum of 60)	60	———
Ground Water to Surface Water Migration Component Score for a Watershed		
27. Watershed Score[c] (lines 11 + 19 + 26, subject to a maximum of 100)	100	———
28. Component Score (S_{gs})[c] (highest score from Line 27 for all watersheds evaluated, subject to a maximum of 100)	100	———

[a] Maximum value applies to waste characteristics category.
[b] Maximum value not applicable.
[c] Do not round to nearest integer.

4.2.2 *Drinking water threat.* Evaluate the drinking water threat for each watershed based on three factor categories: likelihood of release, waste characteristics, and targets.

4.2.2.1 *Drinking water threat-likelihood of release.* Evaluate the likelihood of release factor category for each watershed in terms of an observed release factor or a potential to release factor.

4.2.2.1.1 *Observed release.* Establish an observed release to the uppermost aquifer as specified in section 3.1.1. If an observed release can be established for the uppermost aquifer, assign an observed release factor value of 550 to that watershed, enter this value in Table 4-25, and proceed to section 4.2.2.1.3. If no observed release can be established, assign an observed release factor value of 0, enter this value in Table 4-25, and proceed to section 4.2.2.1.2.

4.2.2.1.2 *Potential to release.* Evaluate potential to release only if an observed release cannot be established for the uppermost aquifer. Calculate a potential to release value for the uppermost aquifer as specified in section 3.1.2 and sections 3.1.2.1 through 3.1.2.5. Assign the potential to release value for the uppermost aquifer as the potential to release factor value for the watershed. Enter this value in Table 4-25.

4.2.2.1.3 *Calculation of drinking water threat-likelihood of release factor category value.* If an observed release is established for the uppermost aquifer, assign the observed release factor value of 550 as the likelihood of release factor category value for the watershed. Otherwise, assign the potential to release factor value as the likelihood of release factor category value for the watershed. Enter the value assigned in Table 4-25.

4.2.2.2 *Drinking water threat-waste characteristics.* Evaluate the waste characteristics factor category for each watershed based on two factors: toxicity/mobility/persistence and hazardous waste quantity. Evaluate only those hazardous substances available to migrate from the sources at the site to the uppermost aquifer (see section 3.2). Such hazardous substances include:

- Hazardous substances that meet the criteria for an observed release to ground water.
- All hazardous substances associated with a source that has a ground water containment factor value greater than 0 (see sections 2.2.2, 2.2.3, and 3.1.2.1).

4.2.2.2.1 *Toxicity/mobility/persistence.* For each hazardous substance, assign a toxicity factor value, a mobility factor value, a persistence factor value, and a combined toxicity/mobility/persistence factor value as specified in sections 4.2.2.2.1.1 through 4.2.2.2.1.4.

4.2.2.2.1.1 *Toxicity.* Assign a toxicity factor value to each hazardous substance as specified in section 2.4.1.1.

4.2.2.2.1.2 *Mobility.* Assign a ground water mobility factor value to each hazardous substance as specified in section 3.2.1.2.

4.2.2.2.1.3 *Persistence.* Assign a surface water persistence factor value to each hazardous substance as specified in section 4.1.2.2.1.2.

4.2.2.2.1.4 *Calculation of toxicity/mobility/persistence factor value.* First, assign each hazardous substance a toxicity/mobility factor value from Table 3-9 (section 3.2.1.3), based on the values assigned to the hazardous substance for the toxicity and mobility factors. Then assign each hazardous substance a toxicity/mobility/persistence factor value from Table 4-26, based on the values assigned for the toxicity/mobility and persistence factors. Use the substance with the highest toxicity/mobility/persistence factor value for the watershed to assign the value to this factor. Enter this value in Table 4-25.

4.2.2.2.2 *Hazardous waste quantity.* Assign the same factor value for hazardous waste quantity for the watershed as would be assigned for the uppermost aquifer in section 3.2.2. Enter this value in Table 4-25.

4.2.2.2.3 *Calculation of drinking water threat-waste characteristics factor category value.* Multiply the toxicity/mobility/persistence and hazardous waste quantity factor values for the watershed, subject to a maximum product of 1×10^8. Based on this product, assign a value from Table 2-7 (section 2.4.3.1) to the drinking water threat-waste characteristics factor category for the watershed. Enter this value in Table 4-25.

4.2.2.3 *Drinking water threat-targets.* Evaluate the targets factor category for each watershed based on three factors: nearest intake, population, and resources.

BILLING CODE 6560-50-M

TABLE 4-26
TOXICITY/MOBILITY/PERSISTENCE FACTOR VALUES[a]

Toxicity/Mobility Factor Value	Persistence Factor Value			
	1.0	0.4	0.07	0.0007
10,000	10,000	4,000	700	7
2,000	2,000	800	140	1.4
1,000	1,000	400	70	0.7
200	200	80	14	0.14
100	100	40	7	0.07
20	20	8	1.4	0.014
10	10	4	0.7	0.007
2	2	0.8	0.14	0.0014
1	1	0.4	0.07	7×10^{-4}
0.2	0.2	0.08	0.014	1.4×10^{-4}
0.1	0.1	0.04	0.007	7×10^{-5}
0.02	0.02	0.008	0.0014	1.4×10^{-5}
0.01	0.01	0.004	7×10^{-4}	7×10^{-6}
0.002	0.002	8×10^{-4}	1.4×10^{-4}	1.4×10^{-6}
0.001	0.001	4×10^{-4}	7×10^{-5}	7×10^{-7}
2×10^{-4}	2×10^{-4}	8×10^{-5}	1.4×10^{-5}	1.4×10^{-7}
1×10^{-4}	1×10^{-4}	4×10^{-5}	7×10^{-6}	7×10^{-8}
2×10^{-5}	2×10^{-5}	8×10^{-6}	1.4×10^{-6}	1.4×10^{-8}
2×10^{-6}	2×10^{-6}	8×10^{-7}	1.4×10^{-7}	1.4×10^{-9}
2×10^{-7}	2×10^{-7}	8×10^{-8}	1.4×10^{-8}	1.4×10^{-10}
2×10^{-8}	2×10^{-8}	8×10^{-9}	1.4×10^{-9}	1.4×10^{11}
2×10^{-9}	2×10^{-9}	8×10^{-10}	1.4×10^{-10}	1.4×10^{-12}
0	0	0	0	0

[a]Do not round to nearest integer.

BILLING CODE 6560-50-C

For the nearest intake and population factors, determine whether the target surface water intakes are subject to actual or potential contamination as specified in section 4.1.1.2, subject to the restrictions specified in sections 4.2.1.3 and 4.2.1.4.

When the intake is subject to actual contamination, evaluate it using Level I concentrations or Level II concentrations. Determine which level applies for the intake by comparing the exposure concentrations from a sample (or comparable samples) to health-based benchmarks as specified in section 4.1.2.3, except use only those samples from the surface water in-water segment and only those hazardous substances in such samples that meet the conditions in sections 4.2.1.3 and 4.2.1.4.

4.2.2.3.1 *Nearest intake.* Assign a value to the nearest intake factor as specified in section 4.1.2.3.1 with the following modification. For the intake being evaluated, multiply its dilution weight from Table 4–13 (section 4.1.2.3.1) by a value selected from Table 4–27. Use the resulting product, not the value from Table 4–13, as the dilution weight for the intake for the ground water to surface water component. Do not round this product to the nearest integer.

Select the value from Table 4–27 based on the angle Θ, the angle defined by the sources at the site and either the two points at the intersection of the surface water body and the 1-mile distance ring or any two other points of the surface water body within the 1-mile distance ring, whichever results in the largest angle. (See Figure 4–3 for an example of how to determine Θ.) If the surface water body does not extend to the 1-mile ring at one or both ends, define Θ using the surface water endpoint(s) within the 1-mile ring or any two other points of the surface water body within the 1-mile distance ring, whichever results in the largest angle.

TABLE 4–27.—DILUTION WEIGHT ADJUSTMENTS

Angle Θ (degrees)	Assigned value[a]
0	0
Greater than 0 to 18	0.05
Greater than 18 to 54	0.1
Greater than 54 to 90	0.2
Greater than 90 to 126	0.3
Greater than 126 to 162	0.4
Greater than 162 to 198	0.5
Greater than 198 to 234	0.6
Greater than 234 to 270	0.7
Greater than 270 to 306	0.8
Greater than 306 to 342	0.9
Greater than 342 to 360	1.0

[a] Do not round to nearest integer.

BILLING CODE 6560-50-M

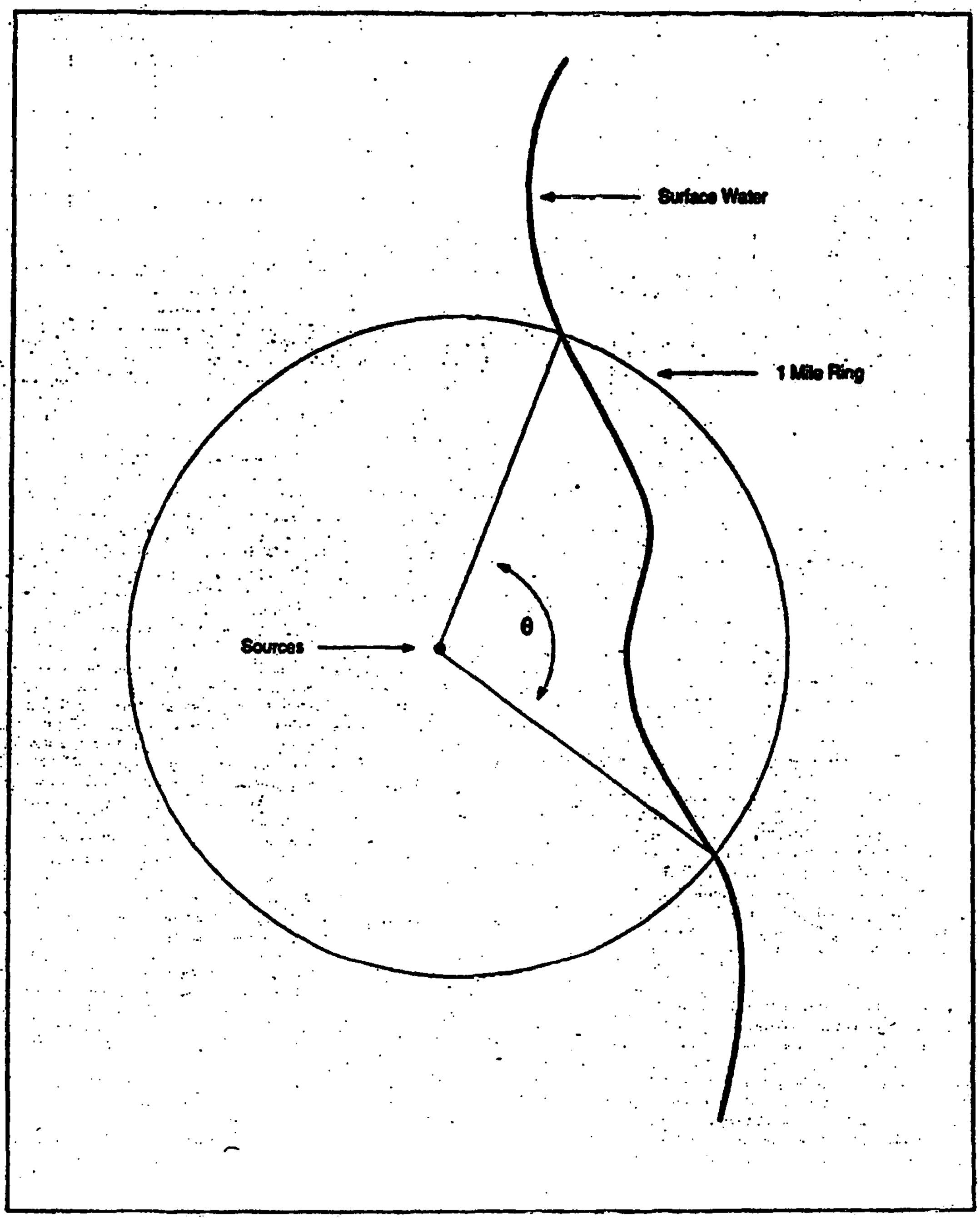


FIGURE 4-3
SAMPLE DETERMINATION OF GROUND WATER
TO SURFACE WATER ANGLE

TABLE 4-28
TOXICITY/MOBILITY/PERSISTENCE/BIOACCUMULATION FACTOR VALUES[a]

Toxicity/ Mobility/ Persistence Factor Value	Bioaccumulation Potential Factor Value					
	50,000	5,000	500	50	5	0.5
10,000	5×10^8	5×10^7	5×10^6	5×10^5	5×10^4	5,000
4,000	2×10^8	2×10^7	2×10^6	2×10^5	2×10^4	2,000
2,000	1×10^8	1×10^7	1×10^6	1×10^5	1×10^4	1,000
1,000	5×10^7	5×10^6	5×10^5	5×10^4	5,000	500
800	4×10^7	4×10^6	4×10^5	4×10^4	4,000	400
700	3.5×10^7	3.5×10^6	3.5×10^5	3.5×10^4	3,500	350
400	2×10^7	2×10^6	2×10^5	2×10^4	2,000	200
200	1×10^7	1×10^6	1×10^5	1×10^4	1,000	100
140	7×10^6	7×10^5	7×10^4	7,000	700	70
100	5×10^6	5×10^5	5×10^4	5,000	500	50
80	4×10^6	4×10^5	4×10^4	4,000	400	40
70	3.5×10^6	3.5×10^5	3.5×10^4	3,500	350	35
40	2×10^6	2×10^5	2×10^4	2,000	200	20
20	1×10^6	1×10^5	1×10^4	1,000	100	10
14	7×10^5	7×10^4	7,000	700	70	7
10	5×10^5	5×10^4	5,000	500	50	5
8	4×10^5	4×10^4	4,000	400	40	4
7	3.5×10^5	3.5×10^4	3,500	350	35	3.5
4	2×10^5	2×10^4	2,000	200	20	2
2	1×10^5	1×10^4	1,000	100	10	1
1.4	7×10^4	7,000	700	70	7	0.7

TABLE 4-28 (Continued)

Toxicity/ Mobility/ Persistence Factor Value	Bioaccumulation Potential Factor Value					
	50,000	5,000	500	50	5	0.5
1.0	5×10^4	5,000	500	50	5	0.5
0.8	4×10^4	4,000	400	40	4	0.4
0.7	3.5×10^4	3,500	350	35	3.5	0.35
0.4	2×10^4	2,000	200	20	2	0.2
0.2	1×10^4	1,000	100	10	1	0.1
0.14	7,000	700	70	7	0.7	0.07
0.1	5,000	500	50	5	0.5	0.05
0.08	4,000	400	40	4	0.4	0.04
0.07	3,500	350	35	3.5	0.35	0.035
0.04	2,000	200	20	2	0.2	0.02
0.02	1,000	100	10	1	0	0.01
0.014	700	70	7	0.7	0.07	0.007
0.01	500	50	5	0.5	0.05	0.005
0.008	400	40	4	0.4	0.04	0.004
0.007	350	35	3.5	0.35	0.035	0.0035
0.004	200	20	2	0.2	0.02	0.002
0.002	100	10	1	0.1	0.01	0.001
0.0014	70	7	0.7	0.07	0.007	7×10^{-4}
0.001	50	5	0.5	0.05	0.005	5×10^{-4}
8×10^{-4}	40	4	0.4	0.04	0.004	4×10^{-4}
7×10^{-4}	35	3.5	0.35	0.035	0.0035	3.5×10^{-4}
4×10^{-4}	20	2	0.2	0.02	0.002	2×10^{-4}

TABLE 4-28 (Continued)

Toxicity/ Mobility/ Persistence Factor Value	Bioaccumulation Potential Factor Value					
	50,000	5,000	500	50	5	0.5
2×10^{-4}	10	1	0.1	0.01	0.001	1×10^{-4}
1.4×10^{-4}	7	0.7	0.07	0.007	7×10^{-4}	7×10^{-5}
1×10^{-4}	5	0.5	0.05	0.005	5×10^{-4}	5×10^{-5}
8×10^{-5}	4	0.4	0.04	0.004	4×10^{-4}	4×10^{-5}
7×10^{-5}	3.5	0.35	0.035	0.0035	3.5×10^{-4}	3.5×10^{-5}
4×10^{-5}	2	0.2	0.02	0.002	2×10^{-4}	2×10^{-5}
2×10^{-5}	1	0.1	0.01	0.001	1×10^{-4}	1×10^{-5}
1.4×10^{-5}	0.7	0.07	0.007	7×10^{-4}	7×10^{-5}	7×10^{-6}
8×10^{-6}	0.4	0.04	0.004	4×10^{-4}	4×10^{-5}	4×10^{-6}
7×10^{-6}	0.35	0.035	0.0035	3.5×10^{-4}	3.5×10^{-5}	3.5×10^{-6}
2×10^{-6}	0.1	0.01	0.001	1×10^{-4}	1×10^{-5}	1×10^{-6}
1.4×10^{-6}	0.07	0.007	7×10^{-4}	7×10^{-5}	7×10^{-6}	7×10^{-7}
8×10^{-7}	0.04	0.004	4×10^{-4}	4×10^{-5}	4×10^{-6}	4×10^{-7}
7×10^{-7}	0.035	0.0035	3.5×10^{-4}	3.5×10^{-5}	3.5×10^{-6}	3.5×10^{-7}
2×10^{-7}	0.01	0.001	1×10^{-4}	1×10^{-5}	1×10^{-6}	1×10^{-7}
1.4×10^{-7}	0.007	7×10^{-4}	7×10^{-5}	7×10^{-6}	7×10^{-7}	7×10^{-8}
8×10^{-8}	0.004	4×10^{-4}	4×10^{-5}	4×10^{-6}	4×10^{-7}	4×10^{-8}
7×10^{-8}	0.0035	3.5×10^{-4}	3.5×10^{-5}	3.5×10^{-6}	3.5×10^{-7}	3.5×10^{-8}
2×10^{-8}	0.001	1×10^{-4}	1×10^{-5}	1×10^{-6}	1×10^{-7}	1×10^{-8}
1.4×10^{-8}	7×10^{-4}	7×10^{-5}	7×10^{-6}	7×10^{-7}	7×10^{-8}	7×10^{-9}

TABLE 4-28 (Concluded)

Toxicity/ Mobility/ Persistence Factor Value	Bioaccumulation Potential Factor Value					
	50,000	5,000	500	50	5	0.5
8×10^{-9}	4×10^{-4}	4×10^{-5}	4×10^{-6}	4×10^{-7}	4×10^{-8}	4×10^{-9}
2×10^{-9}	1×10^{-4}	1×10^{-5}	1×10^{-6}	1×10^{-7}	1×10^{-8}	1×10^{-9}
1.4×10^{-9}	7×10^{-5}	7×10^{-6}	7×10^{-7}	7×10^{-8}	7×10^{-9}	7×10^{-10}
8×10^{-10}	4×10^{-5}	4×10^{-6}	4×10^{-7}	4×10^{-8}	4×10^{-9}	4×10^{-10}
1.4×10^{-10}	7×10^{-6}	7×10^{-7}	7×10^{-8}	7×10^{-9}	7×10^{-10}	4×10^{-11}
1.4×10^{-11}	7×10^{-7}	7×10^{-8}	7×10^{-9}	7×10^{-10}	7×10^{-11}	7×10^{-12}
1.4×10^{-12}	7×10^{-8}	7×10^{-9}	7×10^{-10}	7×10^{-11}	7×10^{-12}	7×10^{-13}
0	0	0	0	0	0	0

[a] Do not round to nearest integer.

BILLING CODE 6560-50-C

4.2.2.3.2 *Population.* Evaluate the population factor for the watershed based on three factors: Level I concentrations, Level II concentrations, and potential contamination. Determine which factor applies to an intake as specified in section 4.2.2.3. Determine the population to be counted for that intake as specified in section 4.1.2.3.2, using the target distance limits in section 4.2.1.4 and the hazardous substance migration path in section 4.2.1.2.

4.2.2.3.2.1 *Level I concentrations.* Assign a value to this factor as specified in section 4.1.2.3.2.2.

4.2.2.3.2.2 *Level II concentrations.* Assign a value to this factor as specified in section 4.1.2.3.2.3.

4.2.2.3.2.3 *Potential contamination.* For each applicable type of surface water body in Table 4–26, determine the dilution-weighted population value as specified in section 4.1.2.3.2.4. Select the appropriate dilution weight adjustment value from Table 4–27 as specified in section 4.2.2.3.1.

Calculate the value for the potential contamination factor (PC) for the watershed as follows:

$$PC = \frac{A}{10} \sum_{i=1}^{n} W_i$$

where:

A = Dilution weight adjustment value from Table 4–27.

W_i = Dilution-weighted population from Table 4–14 for surface water body type i.

n = Number of different surface water body types in the watershed.

If PC is less than 1, do not round it to the nearest integer; if PC is 1 or more, round to the nearest integer. Enter the value in Table 4–25.

4.2.2.3.2.4 *Calculation of population factor value.* Sum the factor values for Level I concentrations, Level II concentrations, and potential contamination. Do not round this sum to the nearest integer. Assign this sum as the population factor value for the watershed. Enter this value in Table 4–25.

4.2.2.3.3 *Resources.* Assign a value to the resources factor as specified in section 4.1.2.3.3.

4.2.2.3.4 *Calculation of drinking water threat-targets factor category value.* Sum the nearest intake, population, and resources factor values for the watershed. Do not round this sum to the nearest integer. Assign this sum as the drinking water threat-targets factor category value for the watershed. Enter this value in Table 4–25.

4.2.2.4 *Calculation of drinking water threat score for a watershed.* Multiply the drinking water threat factor category values for likelihood of release, waste characteristics, and targets for the watershed, and round the product to the nearest integer. Then divide by 82,500. Assign the resulting value, subject to a maximum of 100, as the drinking water threat score for the watershed. Enter this score in Table 4–25.

4.2.3 *Human food chain threat.* Evaluate the human food chain threat for a watershed based on three factor categories: likelihood of release, waste characteristics, and targets.

4.2.3.1 *Human food chain threat-likelihood of release.* Assign the same likelihood of release factor category value for the human food chain threat for the watershed as would be assigned in section 4.2.2.1.3 for the drinking water threat. Enter this value in Table 4–25.

4.2.3.2 *Human food chain threat-waste characteristics.* Evaluate the waste characteristics factor category for each watershed based on two factors: toxicity/mobility/persistence/bioaccumulation and hazardous waste quantity.

4.2.3.2.1 *Toxicity/mobility/persistence/bioaccumulation.* Evaluate all those hazardous substances eligible to be evaluated for toxicity/mobility/persistence in the drinking water threat for the watershed (see section 4.2.2.2.1).

4.2.3.2.1.1 *Toxicity.* Assign a toxicity factor value to each hazardous substance as specified in section 2.4.1.1.

4.2.3.2.1.2 *Mobility.* Assign a ground water mobility factor value to each hazardous substance as specified for the drinking water threat (see section 4.2.2.2.1.2).

4.2.3.2.1.3 *Persistence.* Assign a surface water persistence factor value to each hazardous substance as specified for the drinking water threat (see section 4.2.2.2.1.3), except: use the predominant water category (that is, lakes; or rivers, oceans, coastal tidal waters, or Great Lakes) between the probable point of entry and the nearest fishery (not the nearest drinking water or resources intake) along the hazardous substance migration path for the watershed to determine which portion of Table 4–10 to use. Determine the predominant water category based on distance as specified in section 4.1.2.2.1.2.

4.2.3.2.1.4 *Bioaccumulation potential.* Assign a bioaccumulation potential factor value to each hazardous substance as specified in section 4.1.3.2.1.3.

4.2.3.2.1.5 *Calculation of toxicity/mobility/persistence/ bioaccumulation factor value.* Assign each hazardous substance a toxicity/mobility factor value from Table 3–9 (section 3.2.1.3), based on the values assigned to the hazardous substance for the toxicity and mobility factors. Then assign each hazardous substance a toxicity/mobility/persistence factor value from Table 4–28, based on the values assigned for the toxicity/mobility and persistence factors. Then assign each hazardous substance a toxicity/mobility/persistence/bioaccumulation factor value from Table 4–28. Use the substance with the highest toxicity/mobility/persistence/bioaccumulation factor value for the watershed to assign the value to this factor for the watershed. Enter this value in Table 4–25.

BILLING CODE 6560-50-M

4.2.3.2.2 *Hazardous waste quantity.* Assign the same factor value for hazardous waste quantity for the watershed as would be assigned in section 4.2.2.2.2 for the drinking water threat. Enter this value in Table 4-25.

4.2.3.2.3 *Calculation of human food chain threat-waste characteristics factor category value.* For the hazardous substance selected for the watershed in section 4.2.3.2.1.5, use its toxicity/mobility/persistence factor value and bioaccumulation potential factor value as follows to assign a value to the waste characteristics factor category. First, multiply the toxicity/mobility/persistence factor value and the hazardous waste quantity factor value for the watershed, subject to a maximum product of 1×10^8. Then multiply this product by the bioaccumulation potential factor value for this hazardous substance, subject to a maximum product of 1×10^{12}. Based on this second product, assign a value from Table 2-7 (section 2.4.3.1) to the human food chain threat-waste characteristics factor category for the watershed. Enter this value in Table 4-25.

4.2.3.3 *Human food chain threat-targets.* Evaluate two target factors for the watershed: food chain individual and population.

For both factors, determine whether the target fisheries are subject to Level I concentrations, Level II concentrations, or potential human food chain contamination. Determine which applies to each fishery (or portion of a fishery) as specified in section 4.1.3.3, subject to the restrictions specified in sections 4.2.1.3 and 4.2.1.4.

4.2.3.3.1 *Food chain individual.* Assign a value to the food chain individual factor as specified in section 4.1.3.3.1 with the following modification. When a dilution weight is used, multiply the appropriate dilution weight from Table 4-13 by the adjustment value selected from Table 4-27, as specified in section 4.2.2.3.1. Use the resulting product, not the value from Table 4-13, as the dilution weight in assigning the factor value. Do not round this product to the nearest integer. Enter the value assigned in Table 4-25.

4.2.3.3.2 *Population.* Evaluate the population factor for the watershed based on three factors: Level I concentrations, Level II concentrations, and potential human food chain contamination. Determine which of these factors is to be applied to each fishery as specified in section 4.2.3.3.

4.2.3.3.2.1 *Level I concentrations.* Assign a value to this factor as specified in section 4.1.3.3.2.1. Enter this value in Table 4-25.

4.2.3.3.2.2 *Level II concentrations.* Assign a value to this factor as specified in section 4.1.3.3.2.2. Enter this value in Table 4-25.

4.2.3.3.2.3 *Potential human food chain contamination.* Assign a value to this factor as specified in section 4.1.3.3.2.3 with the following modification. For each fishery being evaluated, multiply the appropriate dilution weight for that fishery from Table 4-13 by the adjustment value selected from Table 4-27, as specified in section 4.2.2.3.2. Use the resulting product, not the value from Table 4-13, as the dilution weight for the fishery. Do not round this product to the nearest integer. Enter the value assigned in Table 4-25.

4.2.3.3.2.4 *Calculation of population factor value.* Sum the factor values for Level I concentrations, Level II concentrations, and potential human food chain contamination for the watershed. Do not round this sum to the nearest integer. Assign this sum as the population factor value for the watershed. Enter this value in Table 4-25.

4.2.3.3.3 *Calculation of human food chain threat-targets factor category value.* Sum the food chain individual and population factor values for the watershed. Do not round this sum to the nearest integer. Assign this sum as the human food chain threat-targets factor category value for the watershed. Enter this value in Table 4-25.

4.2.3.4 *Calculation of human food chain threat score for a watershed.* Multiply the human food chain threat factor category values for likelihood of release, waste characteristics, and targets for the watershed, and round the product to the nearest integer. Then divide by 82,500. Assign the resulting value, subject to a maximum of 100, as the human food chain threat score for the watershed. Enter this score in Table 4-25.

4.2.4 *Environmental threat.* Evaluate the environmental threat for the watershed based on three factor categories: likelihood of release, waste characteristics, and targets.

4.2.4.1 *Environmental threat-likelihood of release.* Assign the same likelihood of release factor category value for the environmental threat for the watershed as would be assigned in section 4.2.2.1.3 for the drinking water threat. Enter this value in Table 4-25.

4.2.4.2 *Environmental threat-waste characteristics.* Evaluate the waste characteristics factor category for each watershed based on two factors: ecosystem toxicity/mobility/persistence/bioaccumulation and hazardous waste quantity.

4.2.4.2.1 *Ecosystem toxicity/mobility/persistence/bioaccumulation.* Evaluate all those hazardous substances eligible to be evaluated for toxicity/mobility/persistence in the drinking water threat for the watershed (see section 4.2.2.2.1).

4.2.4.2.1.1 *Ecosystem toxicity.* Assign an ecosystem toxicity factor value to each hazardous substance as specified in section 4.1.4.2.1.1.

4.2.4.2.1.2 *Mobility.* Assign a ground water mobility factor value to each hazardous substance as specified in section 4.2.2.2.1.2 for the drinking water threat.

4.2.4.2.1.3 *Persistence.* Assign a surface water persistence factor value to each hazardous substance as specified in section 4.2.2.2.1.3 for the drinking water threat, except: use the predominant water category (that is, lakes; or rivers, oceans, coastal tidal waters, or Great Lakes) between the probable point of entry and the nearest sensitive environment (not the nearest drinking water or resources intake) along the hazardous substance migration path for the watershed to determine which portion of Table 4-10 to use. Determine the predominant water category based on distance as specified in section 4.1.2.2.1.2.

4.2.4.2.1.4 *Ecosystem bioaccumulation potential.* Assign an ecosystem bioaccumulation potential factor value to each hazardous substance as specified in section 4.1.4.2.1.3.

4.2.4.2.1.5 *Calculation of ecosystem toxicity/mobility/persistence/bioaccumulation factor value.* Assign each hazardous substance an ecosystem toxicity/mobility factor value from Table 3-9 (section 3.2.1.3), based on the values assigned to the hazardous substance for the ecosystem toxicity and mobility factors. Then assign each hazardous substance an ecosystem toxicity/mobility/persistence factor value from Table 4-29, based on the values assigned for the ecosystem toxicity/mobility and persistence factors. Then assign each hazardous substance an ecosystem toxicity/mobility/persistence/bioaccumulation factor value from Table 4-30, based on the values assigned for the ecosystem toxicity/mobility/persistence and ecosystem bioaccumulation potential factors. Select the substance with the highest ecosystem toxicity/mobility/persistence/bioaccumulation factor value for the watershed and use it to assign the value to this factor for the watershed. Enter this value in Table 4-25.

BILLING CODE 6560-50-M

TABLE 4-29
ECOSYSTEM TOXICITY/MOBILITY/PERSISTENCE FACTOR VALUES[a]

Ecosystem Toxicity/Mobility Factor Value	Persistence Factor Value			
	1.0	0.4	0.07	0.0007
10,000	10,000	4,000	700	7
2,000	2,000	800	140	1.4
1,000	1,000	400	70	0.7
200	200	80	14	0.14
100	100	40	7	0.07
20	20	8	1.4	0.014
10	10	4	0.7	0.007
2	2	0.8	0.14	0.0014
1	1	0.4	0.07	7×10^{-4}
0.2	0.2	0.08	0.014	1.4×10^{-4}
0.1	0.1	0.04	0.007	7×10^{-5}
0.02	0.02	0.008	0.0014	1.4×10^{-5}
0.01	0.01	0.004	7×10^{-4}	7×10^{-6}
0.002	0.002	8×10^{-4}	1.4×10^{-4}	1.4×10^{-6}
0.001	0.001	4×10^{-4}	7×10^{-5}	7×10^{-7}
2×10^{-4}	2×10^{-4}	8×10^{-5}	1.4×10^{-5}	1.4×10^{-7}
1×10^{-4}	1×10^{-4}	4×10^{-5}	7×10^{-6}	7×10^{-8}
2×10^{-5}	2×10^{-5}	8×10^{-6}	1.4×10^{-6}	1.4×10^{-8}
2×10^{-6}	2×10^{-6}	8×10^{-7}	1.4×10^{-7}	1.4×10^{-9}
2×10^{-7}	2×10^{-7}	8×10^{-8}	1.4×10^{-8}	1.4×10^{-10}
2×10^{-8}	2×10^{-8}	8×10^{-9}	1.4×10^{-9}	1.4×10^{-11}
2×10^{-9}	2×10^{-9}	8×10^{-10}	1.4×10^{-10}	1.4×10^{-12}
0	0	0	0	0

[a]Do not round to nearest integer.

TABLE 4-30
ECOSYSTEM TOXICITY/MOBILITY/PERSISTENCE/BIOACCUMULATION FACTOR VALUES[a]

Ecosystem Toxicity/ Mobility/ Persistence Factor Value	Ecosystem Bioaccumulation Potential Factor Value					
	50,000	5,000	500	50	5	0.5
10,000	5×10^8	5×10^7	5×10^6	5×10^5	5×10^4	5,000
4,000	2×10^8	2×10^7	2×10^6	2×10^5	2×10^4	2,000
2,000	1×10^8	1×10^7	1×10^6	1×10^5	1×10^4	1,000
1,000	5×10^7	5×10^6	5×10^5	5×10^4	5,000	500
800	4×10^7	4×10^6	4×10^5	4×10^4	4,000	400
700	3.5×10^7	3.5×10^6	3.5×10^5	3.5×10^4	3,500	350
400	2×10^7	2×10^6	2×10^5	2×10^4	2,000	200
200	1×10^7	1×10^6	1×10^5	1×10^4	1,000	100
140	7×10^6	7×10^5	7×10^4	7,000	700	70
100	5×10^6	5×10^5	5×10^4	5,000	500	50
80	4×10^6	4×10^5	4×10^4	4,000	400	40
70	3.5×10^6	3.5×10^5	3.5×10^4	3,500	350	35
40	2×10^6	2×10^5	2×10^4	2,000	200	20
20	1×10^6	1×10^5	1×10^4	1,000	100	10
14	7×10^5	7×10^4	7,000	700	70	7
10	5×10^5	5×10^4	5,000	500	50	5
8	4×10^5	4×10^4	4,000	400	40	4
7	3.5×10^5	3.5×10^4	3,500	350	35	3.5
4	2×10^5	2×10^4	2,000	200	20	2
2	1×10^5	1×10^4	1,000	100	10	1
1.4	7×10^4	7,000	700	70	7	0.7

TABLE 4-30 (Continued)

Ecosystem Toxicity/ Mobility/ Persistence Factor Value	Esosystem Bioaccumulation Potential Factor Value					
	50,000	5,000	500	50	5	0.5
1.0	5×10^4	5,000	500	50	5	0.5
0.8	4×10^4	4,000	400	40	4	0.4
0.7	3.5×10^4	3,500	350	35	3.5	0.35
0.4	2×10^4	2,000	200	20	2	0.2
0.2	1×10^4	1,000	100	10	1	0.1
0.14	7,000	700	70	7	0.7	0.07
0.1	5,000	500	50	5	0.5	0.05
0.08	4,000	400	40	4	0.4	0.04
0.07	3,500	350	35	3.5	0.35	0.035
0.04	2,000	200	20	2	0.2	0.02
0.02	1,000	100	10	1	0.1	0.01
0.014	700	70	7	0.7	0.07	0.007
0.01	500	50	5	0.5	0.05	0.005
0.008	400	40	4	0.4	0.04	0.004
0.007	350	35	3.5	0.35	0.035	0.0035
0.004	200	20	2	0.2	0.02	0.002
0.002	100	10	1	0.1	0.01	0.001
0.0014	70	7	0.7	0.07	0.007	7×10^{-4}
0.001	50	5	0.5	0.05	0.005	5×10^{-4}
8×10^{-4}	40	4	0.4	0.04	0.004	4×10^{-4}
7×10^{-4}	35	3.5	0.35	0.035	0.0035	3.5×10^{-4}
4×10^{-4}	20	2	0.2	0.02	0.002	2×10^{-4}

TABLE 4-30 (Continued)

Ecosystem Toxicity/ Mobility/ Persistence Factor Value	Ecosystem Bioaccumulation Potential Factor Value					
	50,000	5,000	500	50	5	0.5
2×10^{-4}	10	1	0.1	0.01	0.001	1×10^{-4}
1.4×10^{-4}	7	0.7	0.07	0.007	7×10^{-4}	7×10^{-5}
1×10^{-4}	5	0.5	0.05	0.005	5×10^{-4}	5×10^{-5}
8×10^{-5}	4	0.4	0.04	0.004	4×10^{-4}	4×10^{-5}
7×10^{-5}	3.5	0.35	0.035	0.0035	3.5×10^{-4}	3.5×10^{-5}
4×10^{-5}	2	0.2	0.02	0.002	2×10^{-4}	2×10^{-5}
2×10^{-5}	1	0.1	0.01	0.001	1×10^{-4}	1×10^{-5}
1.4×10^{-5}	0.7	0.07	0.007	7×10^{-4}	7×10^{-5}	7×10^{-6}
8×10^{-6}	0.4	0.04	0.004	4×10^{-4}	4×10^{-5}	4×10^{-6}
7×10^{-6}	0.35	0.035	0.0035	3.5×10^{-4}	3.5×10^{-5}	3.5×10^{-6}
2×10^{-6}	0.1	0.01	0.001	1×10^{-4}	1×10^{-5}	1×10^{-6}
1.4×10^{-6}	0.07	0.007	7×10^{-4}	7×10^{-5}	7×10^{-6}	7×10^{-7}
8×10^{-7}	0.04	0.004	4×10^{-4}	4×10^{-5}	4×10^{-6}	4×10^{-7}
7×10^{-7}	0.035	0.0035	3.5×10^{-4}	3.5×10^{-5}	3.5×10^{-6}	3.5×10^{-7}
2×10^{-7}	0.01	0.001	1×10^{-4}	1×10^{-5}	1×10^{-6}	1×10^{-7}
1.4×10^{-7}	0.007	7×10^{-4}	7×10^{-5}	7×10^{-6}	7×10^{-7}	7×10^{-8}
8×10^{-8}	0.004	4×10^{-4}	4×10^{-5}	4×10^{-6}	4×10^{-7}	4×10^{-8}
7×10^{-8}	0.0035	3.5×10^{-4}	3.5×10^{-5}	3.5×10^{-6}	3.5×10^{-7}	3.5×10^{-8}
2×10^{-8}	0.001	1×10^{-4}	1×10^{-5}	1×10^{-6}	1×10^{-7}	1×10^{-8}
1.4×10^{-8}	7×10^{-4}	7×10^{-5}	7×10^{-6}	7×10^{-7}	7×10^{-8}	7×10^{-9}

TABLE 4-30 (Concluded)

Ecosystem Toxicity/ Mobility/ Persistence Factor Value	Ecosystem Bioaccumulation Potential Factor Value					
	50,000	5,000	500	50	5	0.5
8×10^{-9}	4×10^{-4}	4×10^{-5}	4×10^{-6}	4×10^{-7}	4×10^{-8}	4×10^{-9}
2×10^{-9}	1×10^{-4}	1×10^{-5}	1×10^{-6}	1×10^{-7}	1×10^{-8}	1×10^{-9}
1.4×10^{-9}	7×10^{-5}	7×10^{-6}	7×10^{-7}	7×10^{-8}	7×10^{-9}	7×10^{-10}
8×10^{-10}	4×10^{-5}	4×10^{-6}	4×10^{-7}	4×10^{-8}	4×10^{-9}	4×10^{-10}
1.4×10^{-10}	7×10^{-6}	7×10^{-7}	7×10^{-8}	7×10^{-9}	7×10^{-10}	4×10^{-11}
1.4×10^{-11}	7×10^{-7}	7×10^{-8}	7×10^{-9}	7×10^{-10}	7×10^{-11}	7×10^{-12}
1.4×10^{-12}	7×10^{-8}	7×10^{-9}	7×10^{-10}	7×10^{-11}	7×10^{-12}	7×10^{-13}
0	0	0	0	0	0	0

[a] Do not round to nearest integer.

BILLING CODE 6560-50-C

4.2.4.2.2 *Hazardous waste quantity.* Assign the same factor value for hazardous waste quantity for the watershed as would be assigned in section 4.2.2.2.2 for the drinking water threat. Enter this value in Table 4-25.

4.2.4.2.3 *Calculation of environmental threat-waste characteristics factor category value.* For the hazardous substance selected for the watershed in section 4.2.4.2.1.5, use its ecosystem toxicity/mobility/persistence factor value and ecosystem bioaccumulation potential factor value as follows to assign a value to the waste characteristics factor category. First, multiply the ecosystem toxicity/mobility/persistence factor value and the hazardous waste quantity factor value for the watershed, subject to a maximum product of 1×10^{8}. Then multiply this product by the ecosystem bioaccumulation potential factor value for this hazardous substance, subject to a maximum product of 1×10^{12}. Based on this product, assign a value from Table 2-7 (section 2.4.3.1) to the environmental threat-waste characteristics category for the watershed. Enter the value in Table 4-25.

4.2.4.3 *Environmental threat-targets.* Evaluate the environmental threat-targets factor category for a watershed using one factor: sensitive environments.

4.2.4.3.1 *Sensitive environments.* Evaluate sensitive environments for the watershed based on three factors: Level I concentrations, Level II concentrations, and potential contamination. Determine which applies to each sensitive environment as specified in section 4.1.4.3.1, except: use only those samples from the surface water in-water segment and only those hazardous substances in such samples that meet the conditions in sections 4.2.1.3 and 4.2.1.4.

4.2.4.3.1.1 *Level I concentrations.* Assign a value to this factor as specified in section 4.1.4.3.1.1. Enter this value in Table 4-25.

4.2.4.3.1.2 *Level II concentrations.* Assign a value to this factor as specified in section 4.1.4.3.1.2. Enter this value in Table 4-25.

4.2.4.3.1.3 *Potential contamination.* Assign a value to this factor as specified in section 4.1.4.3.1.3 with the following modification. Multiply the appropriate dilution weight from Table 4-13 for the sensitive environments in each type of surface water body by the adjustment value selected from Table 4-27, as specified in section 4.2.2.3.1. Use the resulting product, not the value from Table 4-13, as the dilution weight for the sensitive environments in that type of surface water body. Do not round this product to the nearest integer. Enter the value assigned in Table 4-25.

4.2.4.3.1.4 *Calculation of environmental threat-targets factor category value.* Sum the values for Level I concentrations, Level II concentrations, and potential contamination for the watershed. Do not round this sum to the nearest integer. Assign this sum as the environmental threat targets factor category value for the watershed. Enter this value in Table 4-25.

4.2.4.4 *Calculation of environmental threat score for a watershed.* Multiply the environmental threat factor category values for likelihood of release, waste characteristics, and targets for the watershed, and round the product to the nearest integer. Then divide by 82,500. Assign the resulting value, subject to a maximum of 60, as the environmental threat score for the watershed. Enter this score in Table 4-25.

4.2.5 *Calculation of ground water to surface water migration component score for a watershed.* Sum the scores for the three threats for the watershed (that is, drinking water, human food chain, and environmental threats). Assign the resulting score, subject to a maximum value of 100, as the ground water to surface water migration component score for the watershed. Enter this score in Table 4-25.

4.2.6 *Calculation of ground water to surface water migration component score.* Select the highest ground water to surface water migration component score from the watersheds evaluated. Assign this score as the ground water to surface water migration component score for the site, subject to a maximum score of 100. Enter this score in Table 4-25.

4.3 *Calculation of surface water migration pathway score.* Determine the surface water migration pathway score as follows:

- If only one of the two surface water migration components (overland/flood or ground water to surface water) is scored, assign the score of that component as the surface water migration pathway score.
- If both components are scored, select the higher of the two component scores from sections 4.1.6 and 4.2.6. Assign that score as the surface water migration pathway score.

5.0 Soil Exposure Pathway

Evaluate the soil exposure pathway based on two threats: Resident population threat and nearby population threat. Evaluate both threats based on three factor categories: Likelihood of exposure, waste characteristics, and targets. Figure 5-1 indicates the factors included within each factor category for each type of threat.

Determine the soil exposure pathway score (S_s) in terms of the factor category values as follows:

$$S_s = \frac{\sum_{i=1}^{2} (LE_i)(WC_i)(T_i)}{SF}$$

where:

LE_i = Likelihood of exposure factor category value for threat i (that is, resident population threat or nearby population threat).

WC_i = Waste characteristics factor category value for threat i.

T_i = Targets factor category value for threat i.

SF = Scaling factor.

Table 5-1 outlines the specific calculation procedure.

BILLING CODE 6560-50-M

	Likelihood of Exposure (LE)		Waste Characteristics (WC)		Targets (T)
Resident Population	Observed Contamination Area with Resident Targets	X	Toxicity • Chronic • Carcinogenic • Acute Hazardous Waste Quantity • Hazardous Constituent Quantity • Hazardous Wastestream Quantity • Volume • Area	X	Resident Individual Resident Population • Level I Concentrations • Level II Concentrations Workers Resources Terrestrial Sensitive Environments

+

	Likelihood of Exposure (LE)		Waste Characteristics (WC)		Targets (T)
Nearby Population	Attractiveness/ Accessibility Area of Contamination	X	Toxicity • Chronic • Carcinogenic • Acute Hazardous Waste Quantity • Hazardous Constituent Quantity • Hazardous Wastestream Quantity • Volume • Area	X	Nearby Individual Population Within One Mile

Figure 5-1
OVERVIEW OF SOIL EXPOSURE PATHWAY

BILLING CODE 6560-50-

TABLE 5-1.—SOIL EXPOSURE PATHWAY SCORESHEET

Factor categories and factors	Maximum value	Value assigned
Resident Population Threat		
Likelihood of Exposure		
1. Likelihood of Exposure	550	____
Waste Characteristics		
2. Toxicity	(a)	____
3. Hazardous Waste Quantity	(a)	____
4. Waste Characteristics	100	____
Targets		
5. Resident Individual	50	____
6. Resident Population:		
6a. Level I Concentrations	(b)	____
6b. Level II Concentrations	(b)	____
6c. Resident Population (lines 6a + 6b)	(b)	____
7. Workers	15	____
8. Resources	5	____
9. Terrestrial Sensitive Environments	(c)	____
10. Targets (lines 5 + 6c + 7 + 8 + 9)	(b)	____
Resident Population Threat Score		
11. Resident Population Threat (lines 1 × 4 × 10)	(b)	____
Nearby Population Threat		
Likelihood of Exposure		
12. Attractiveness/Accessibility	100	____
13. Area of Contamination	100	____
14. Likelihood of Exposure	500	____
Waste Characteristics		
15. Toxicity	(a)	____
16. Hazardous Waste Quantity	(a)	____
17. Waste Characteristics	100	____
Targets		
18. Nearby Individual	1	____
19. Population Within 1 Mile	(b)	____
20. Targets (lines 18 + 19)	(b)	____
Nearby Population Threat Score		
21. Nearby Population Threat (lines 14 × 17 × 20)	(b)	____
Soil Exposure Pathway Score		
22. Soil Exposure Pathway Score[d] (S_s), (lines [11+21] / 82,500, subject to a maximum of 100)	100	____

[a] Maximum value applies to waste characteristics category.
[b] Maximum value not applicable.
[c] No specific maximum value applies to factor. However, pathway score based solely on terrestrial sensitive environments is limited to maximum of 60
[d] Do not round to nearest integer.

5.0.1 *General considerations.* Evaluate the soil exposure pathway based on areas of observed contamination:

• Consider observed contamination to be present at sampling locations where analytic evidence indicates that:

–A hazardous substance attributable to the site is present at a concentration significantly above background levels for the site (see Table 2–3 in section 2.3 for the criteria for determining analytical significance), *and*

–This hazardous substance, if not present at the surface, is covered by 2 feet or less of cover material (for example, soil).

• Establish areas of observed contamination based on sampling locations at which there is observed contamination as follows:

–For all sources except contaminated soil, if observed contamination from the site is present at any sampling location within the source, consider that entire source to be an area of observed contamination.

–For contaminated soil, consider both the sampling location(s) with observed contamination from the site and the area lying between such locations to be an area of observed contamination, unless available information indicates otherwise.

• If an area of observed contamination (or portion of such an area) is covered by a permanent, or otherwise maintained, essentially impenetrable material (for example, asphalt) that is not more than 2 feet thick, exclude that area (or portion of the area) in evaluating the soil exposure pathway.

• For an area of observed contamination, consider only those hazardous substances that meet the criteria for observed contamination for that area to be associated with that area in evaluating the soil exposure pathway (see section 2.2.2).

If there is observed contamination, assign scores for the resident population threat and the nearby population threat, as specified in sections 5.1 and 5.2. If there is no observed contamination, assign the soil exposure pathway a score of 0.

5.1 *Resident Population Threat.* Evaluate the resident population threat only if there is an area of observed contamination in one or more of the following locations:

• Within the property boundary of a residence, school, or day care center *and* within 200 feet of the respective residence, school, or day care center, or

• Within a workplace property boundary *and* within 200 feet of a workplace area, or

• Within the boundaries of a resource specified in section 5.1.3.4, or

• Within the boundaries of a terrestrial sensitive environment specified in section 5.1.3.5.

If not, assign the resident population threat a value of 0, enter this value in Table 5–1, and proceed to the nearby population threat (section 5.2).

5.1.1 *Likelihood of exposure.* Assign a value of 550 to the likelihood of exposure factor category for the resident population threat if there is an area of observed contamination in one or more locations listed in section 5.1. Enter this value in Table 5–1.

5.1.2 *Waste characteristics.* Evaluate waste characteristics based on two factors: toxicity and hazardous waste quantity. Evaluate only those hazardous substances that meet the criteria for observed contamination at the site (see section 5.0.1).

5.1.2.1 *Toxicity.* Assign a toxicity factor value to each hazardous substance as specified in section 2.4.1.1. Use the hazardous substance with the highest toxicity factor value to assign the value to the toxicity factor for the resident population threat. Enter this value in Table 5–1.

5.1.2.2 *Hazardous waste quantity.* Assign hazardous waste quantity factor value as specified in section 2.4.2. In estimating the hazardous waste quantity, use Table 5–2 and:

• Consider only the first 2 feet of depth of an area of observed contamination, except as specified for the volume measure.

• Use the volume measure (see section 2.4.2.1.3) only for those types of areas of observed contamination listed in Tier C of Table 5-2. In evaluating the volume measure for these listed areas of observed contamination, use the full volume, not just the volume within the top 2 feet.

• Use the area measure (see section 2.4.2.1.4), not the volume measure, for all other types of areas of observed contamination, even if their volume is known.

Enter the value assigned in Table 5-1.

TABLE 5-2.—HAZARDOUS WASTE QUANTITY EVALUATION EQUATIONS FOR SOIL EXPOSURE PATHWAY

Tier	Measure	Units	Equation for assigning value [a]
A	Hazardous Constituent Quantity (C)	lb	C
B [b]	Hazardous Wastestream Quantity (W)	lb	W/5,000
C [b]	Volume (V)		
	Surface Impoundment [c]	yd³	V/2.5
	Drums [d]	gallon	V/500
	Tanks and Containers Other Than Drums	yd³	V/2.5
D [b]	Area (A)		
	Landfill	ft²	A/34,000
	Surface Impoundment	ft²	A/13
	Surface Impoundment (Buried/backfilled)	ft²	A/13
	Land treatment	ft²	A/270
	Pile [e]	ft²	A/34
	Contaminated Soil	ft²	A/34,000

[a] Do not round nearest integer.

[b] Convert volume to mass when necessary: 1 ton=2,000 pounds=1 cubic yard=4 drums=200 gallons.

[c] Use volume measure only for surface impoundments containing hazardous substances present as liquids. Use area measures in Tier D for dry surface impoundments and for buried/backfilled surface impoundments.

[d] If actual volume of drums is unavailable, assume 1 drum=50 gallons.

[e] Use land surface area under pile, not surface area of pile.

5.1.2.3 *Calculation of waste characteristics factor category value.* Multiply the toxicity and hazardous waste quantity factor values, subject to a maximum product of 1×10^8. Based on this product, assign a value from Table 2-7 (section 2.4.3.1) to the waste characteristics factor category. Enter this value in Table 5-1.

5.1.3 *Targets.* Evaluate the targets factor category for the resident population threat based on five factors: resident individual, resident population, workers, resources, and terrestrial sensitive environments.

In evaluating the targets factor category for the resident population threat, count only the following as targets:

• Resident individual—a person living or attending school or day care on a property with an area of observed contamination *and* whose residence, school, or day care center, respectively, is on or within 200 feet of the area of observed contamination.

• Worker—a person working on a property with an area of observed contamination *and* whose workplace area is on or within 200 feet of the area of observed contamination.

• Resources located on an area of observed contamination, as specified in section 5.1.

• Terrestrial sensitive environments located on an area of observed contamination, as specified in section 5.1.

5.1.3.1 *Resident individual.* Evaluate this factor based on whether there is a resident individual, as specified in section 5.1.3, who is subject to Level I or Level II concentrations.

First, determine those areas of observed contamination subject to Level I concentrations and those subject to Level II concentrations as specified in sections 2.5.1 and 2.5.2. Use the health-based benchmarks from Table 5-3 in determining the level of contamination. Then assign a value to the resident individual factor as follows:

• Assign a value of 50 if there is at least one resident individual for one or more areas subject to Level I concentrations.

• Assign a value of 45 if there is no such resident individuals, but there is at least one resident individual for one or more areas subject to Level II concentrations.

• Assign a value of 0 if there is no resident individual.

Enter the value assigned in Table 5-1.

5.1.3.2 *Resident population.* Evaluate resident population based on two factors: Level I concentrations and Level II concentrations. Determine which factor applies as specified in sections 2.5.1 and 2.5.2, using the health-based benchmarks from Table 5-3. Evaluate populations subject to Level I concentrations as specified in section 5.1.3.2.1 and populations subject to Level II concentrations as specified in section 5.1.3.2.2.

TABLE 5-3.—HEALTH-BASED BENCHMARKS FOR HAZARDOUS SUBSTANCES IN SOILS

• Screening concentration for cancer corresponding to that concentration that corresponds to the 10^{-6} individual cancer risk for oral exposures.

• Screening concentration for noncancer toxicological responses corresponding to the Reference Dose (RfD) for oral exposures.

Count only those persons meeting the criteria for resident individual as specified in section 5.1.3. In estimating the number of people living on property with an area of observed contamination, when the estimate is based on the number of residences, multiply each residence by the average number of persons per residence for the county in which the residence is located.

5.1.3.2.1 *Level I concentrations.* Sum the number of resident individuals subject to Level I concentrations and multiply this sum by 10. Assign the resulting product as the value for this factor. Enter this value in Table 5-1.

5.1.3.2.2 *Level II concentrations.* Sum the number of resident individuals subject to Level II concentrations. Do not include those people already counted under the Level I concentrations factor. Assign this sum as the value for this factor. Enter this value in Table 5-1.

5.1.3.2.3 *Calculation of resident population factor value.* Sum the factor values for Level I concentrations and Level II concentrations. Assign this sum as the resident population factor value. Enter this value in Table 5-1.

5.1.3.3 *Workers.* Evaluate this factor based on the number of workers that meet the section 5.1.3 criteria. Assign a value for these workers using Table 5-4. Enter this value in Table 5-1.

TABLE 5-4.—FACTOR VALUES FOR WORKERS

Number of workers	Assigned value
0	0
1 to 100	5
101 to 1,000	10
Greater than 1,000	15

5.1.3.4 *Resources.* Evaluate the resources factor as follows:

• Assign a value of 5 to the resources factor if one or more of the following is present on an area of observed contamination at the site:

–Commercial agriculture.
–Commercial silviculture.
–Commercial livestock production or commercial livestock grazing.

• Assign a value of 0 if none of the above are present.

Enter the value assigned in Table 5-1.

5.1.3.5 *Terrestrial sensitive environments.* Assign value(s) from Table 5-5 to each terrestrial sensitive environment that meets the eligibility criteria of section 5.1.3.

Calculate a value (ES) for terrestrial sensitive environments as follows:

$$ES = \sum_{i=1}^{n} S_i$$

where:

S_i = Value(s) assigned from Table 5-5 to terrestrial sensitive environment i.

n=Number of terrestrial sensitive environments meeting section 5.1.3 criteria.

Because the pathway score based solely on terrestrial sensitive environments is limited to a maximum of 60, determine the value for the terrestrial sensitive environments factor as follows:

TABLE 5–5.—TERRESTRIAL SENSITIVE ENVIRONMENTS RATING VALUES

Terrestrial sensitive environments	Assigned value
Terrestrial critical habitat [a] for Federal designated endangered or threatened species	100
National Park	
Designated Federal Wilderness Area	
National Monument	
Terrestrial habitat known to be used by Federal designated or proposed threatened or endangered species	75
National Preserve (terrestrial)	
National or State Terrestrial Wildlife Refuge	
Federal land designated for protection of natural ecosystems	
Administratively proposed Federal Wilderness Areas	
Terrestrial areas utilized for breeding by large or dense aggregations of animals [b]	
Terrestrial habitat known to be used by State designated endangered or threatened species	50
Terrestrial habitat known to be used by species under review as to its Federal designated endangered or threatened status	
State lands designated for wildlife or game management	25
State designated Natural Areas	
Particular areas, relatively small in size, important to maintenance of unique biotic communities	

[a] Critical habitat as defined in 50 CFR 424.02.
[b] Limit to vertebrate species.

• Multiply the values assigned to the resident population threat for likelihood of exposure (LE), waste characteristics (WC), and ES. Divide the product by 82,500.

- If the result is 60 or less, assign the value ES as the terrestrial sensitive environments factor value.
- If the result exceeds 60, calculate a value EC as follows:

$$EC = \frac{(60)\ (82,500)}{(LE)\ (WC)}$$

Assign the value EC as the terrestrial sensitive environments factor value. Do not round this value to the nearest interger.

Enter the value assigned for the terrestrial sensitive environments factor in Table 5–1.

5.1.3.6 *Calculation of resident population targets factor category value.* Sum the values for the resident individual, resident population, workers, resources, and terrestrial sensitive environments factors. Do not round to the nearest integer. Assign this sum as the targets factor category value for the resident population threat. Enter this value in Table 5–1.

5.1.4 *Calculation of resident population threat score.* Multiply the values for likelihood of exposure, waste characteristics, and targets for the resident population threat, and round the product to the nearest integer. Assign this product as the resident population threat score. Enter this score in Table 5–1.

5.2 *Nearby population threat.* Include in the nearby population only those individuals who live or attend school within a 1-mile travel distance of an area of observed contamination at the site and who do not meet the criteria for resident individual as specified in section 5.1.3.

Do not consider areas of observed contamination that have an attractiveness/accessibility factor value of 0 (see section 5.2.1.1) in evaluating the nearby population threat.

5.2.1 *Likelihood of exposure.* Evaluate two factors for the likelihood of exposure factor category for the nearby population threat: attractiveness/accessibility and area of contamination.

5.2.1.1 *Attractiveness/accessibility.* Assign a value for attractiveness/accessibility from Table 5–6 to each area of observed contamination, excluding any land used for residences. Select the highest value assigned to the areas evaluated and use it as the value for the attractiveness/accessibility factor. Enter this value in Table 5–1.

5.2.1.2 *Area of contamination.* Evaluate area of contamination based on the total area of the areas of observed contamination at the site. Count only the area(s) that meet the criteria in section 5.0.1 and that receive an attractiveness/accessibility value greater than 0. Assign a value to this factor from Table 5–7. Enter this value in Table 5–1.

TABLE 5–6.—ATTRACTIVENESS/ACCESSIBILITY VALUES

Area of observed contamination	Assigned value
Designated recreational area	100
Regularly used for public recreation (for example, fishing, hiking, softball)	75
Accessible and unique recreational area (for example, vacant lots in urban area)	75
Moderately accessible (may have some access improvements—for example, gravel road), with some public recreation use	50
Slightly accessible (for example, extremely rural area with no road improvement), with some public recreation use	25
Accessible, with no public recreation use	10
Surrounded by maintained fence or combination of maintained fence and natural barriers	5
Physically inaccessible to public, with no evidence of public recreation use	0

TABLE 5–7.—AREA OF CONTAMINATION FACTOR VALUES

Total area of the areas of observed contamination (square feet)	Assigned value
Less than or equal to 5,000	5
Greater than 5,000 to 125,000	20
Greater than 125,000 to 250,000	40
Greater than 250,000 to 375,000	60
Greater than 375,000 to 500,000	80
Greater than 500,000	100

5.2.1.3 *Likelihood of exposure factor category value.* Assign a value from Table 5–8 to the likelihood of exposure factor category, based on the values assigned to the attractiveness/accessibility and area of contamination factors. Enter this value in Table 5–1.

TABLE 5–8.—NEARBY POPULATION LIKELIHOOD OF EXPOSURE FACTOR VALUES

Area of contamination factor value	Attractiveness/accessibility factor value						
	100	75	50	25	10	5	0
100	500	500	375	250	125	50	0
80	500	375	250	125	50	25	0
60	375	250	125	50	25	5	0
40	250	125	50	25	5	5	0
20	125	50	25	5	5	5	0
5	50	25	5	5	5	5	0

5.2.2 *Waste characteristics.* Evaluate waste characteristics based on two factors: toxicity and hazardous waste quantity. Evaluate only those hazardous substances that meet the criteria for observed contamination (see section 5.0.1) at areas that can be assigned an attractiveness/accessibility factor value greater than 0.

5.2.2.1 *Toxicity.* Assign a toxicity factor value as specified in section 2.4.1.1 to each hazardous substance meeting the criteria in section 5.2.2. Use the hazardous substance with the highest toxicity factor value to assign the value to the toxicity factor for the nearby population threat. Enter this value in Table 5–1.

5.2.2.2 *Hazardous waste quantity.* Assign a value to the hazardous waste quantity factor as specified in section 5.1.2.2, except: consider only those areas of observed contamination that can be assigned an attractiveness/accessibility factor value greater than 0. Enter the value assigned in Table 5–1.

5.2.2.3 *Calculation of waste characteristics factor category value.* Multiply the toxicity and hazardous waste quantity factor values, subject to a maximum product of 1×10^{8}. Based on this product, assign a value from Table 2–7 (section 2.4.3.1) to the waste characteristics factor category. Enter this value in Table 5–1.

5.2.3 *Targets.* Evaluate the targets factory category for the nearby population threat based on two factors: nearby individual and population within a 1-mile travel distance from the site.

5.2.3.1 *Nearby individual.* If one or mor persons meet the section 5.1.3 criteria for a resident individual, assign this factor a value of 0. Enter this value in Table 5-1.

If no person meets the criteria for a resident individual, determine the shortest travel distance from the site to any residence or school. In determining the travel distance, measure the shortest overland distance an individual would travel from a residence or school to the nearest area of observed contamination for the site with an attractiveness/accessibility factor value greater than 0. If there are no natural barriers to travel, measure the travel distance as the shortest straight-line distance from the residence or school to the area of observed contamination. If natural barriers exist (for example, a river), measure the travel distance as the shortest straight-line distance from the residence or school to the nearest crossing point and from there as the shortest straight-line distance to the area of observed contamination. Based on the shortest travel distance, assign a value from Table 5-9 to the nearest individual factor. Enter this value in Table 5-1.

TABLE 5-9.—NEARBY INDIVIDUAL FACTOR VALUES

Travel distance for nearby individual (miles)	Assigned value
Greater than 0 to ¼	1*
Greater than ¼ to 1	0

* Assign a value of 0 if one or more persons meet the section 5.1.3 criteria for resident individual.

5.2.3.2 *Population within 1 mile.* Determine the population within each travel distance category of Table 5-10. Count residents and students who attend school within this travel distance. Do not include those people already counted in the resident population threat. Determine travel distances as specified in section 5.2.3.1.

In estimating residential population, when the estimate is based on the number of residences, multiply each residence by the average number of persons per residence for the county in which the residence is located.

Based on the number of people included within a travel distance category, assign a distance-weighted population value for that travel distance from Table 5-10.

Calculate the value for the population within 1 mile factor (PN) as follows:

$$PN = \frac{1}{10} \sum_{i=1}^{3} W_i$$

where:

W_i = Distance-weighted population value from Table 5-10 for travel distance category i.

If PN is less than 1, do not round it to the nearest integer; if PN is 1 or more, round to the nearest integer. Enter this value in Table 5-1.

5.2.3.3 *Calculation of nearby population targets factor category value.* Sum the values for the nearby individual factor and the population within 1 mile factor. Do not round this sum to the nearest integer. Assign this sum as the targets factor category value for the nearby population threat. Enter this value in Table 5-1.

TABLE 5-10.—DISTANCE-WEIGHTED POPULATION VALUES FOR NEARBY POPULATION THREAT *

Travel distance category (miles)	Number of people within the travel distance category: 0	1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,000	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000
Greater than 0 to ¼	0	0.1	0.4	1.0	4	13	41	130	408	1,303	4,081	13,034
Greater than ¼ to ½	0	0.05	0.2	0.7	2	7	20	65	204	652	2,041	6,517
Greater than ½ to 1	0	0.02	0.1	0.3	1	3	10	33	102	326	1,020	3,258

* Round the number of people present within a travel distance category to nearest integer. Do not round the assigned distance-weighted population value to nearest integer.

5.2.4 *Calculation of nearby population threat score.* Multiply the values for likelihood of exposure, waste characteristics, and targets for the nearby population threat, and round the product to the nearest integer. Assign this product as the nearby population threat score. Enter this score in Table 5-1.

5.3 *Calculation of soil exposure pathway score.* Sum the resident population threat score and the nearby population threat score, and divide the sum by 82,500. Assign the resulting value, subject to a maximum of 100, as the soil exposure pathway score (S_s). Enter this score in Table 5-1.

6.0 *Air Migration Pathway*

Evaluate the air migration pathway based on three factor categories: likelihood of release, waste characteristics, and targets. Figure 6-1 indicates the factors included within each factor category.

Determine the air migration pathway score (S_a) in terms of the factor category values as follows:

$$S_a = \frac{(LR)(WC)(T)}{SF}$$

where:

LR = Likelihood of release factor category value.
WC = Waste characteristics factor category value.
T = Targets factor category value.
SF = Scaling factor.

Table 6-1 outlines the specific calculation procedure.

BILLING CODE 6560-50-M

Likelihood of Release (LR)

Observed Release
or
Potential to Release
- Gas Potential to Release
  - Gas Containment
  - Gas Source Type
  - Gas Migration Potential
- Particulate Potential to Release
  - Particulate Containment
  - Particulate Source Type
  - Particulate Migration Potential

X

Waste Characteristics (WC)

Toxicity/Mobility
- Toxicity
  - Chronic
  - Carcinogenic
  - Acute
- Mobility
  - Gaseous Mobility
  - Particulate Mobility

Hazardous Waste Quantity
- Hazardous Constituent Quantity
- Hazardous Wastestream Quantity
- Volume
- Area

X

Targets (T)

Nearest Individual

Population
- Level I Concentrations
- Level II Concentrations
- Potential Contamination

Resources

Sensitive Environments
- Actual Contamination
- Potential Contamination

BILLING CODE 6560-50-C

FIGURE 6-1
OVERVIEW OF AIR MIGRATION PATHWAY

TABLE 6-1.—AIR MIGRATION PATHWAY SCORESHEET

Factor categories and factors	Maximum value	Value assigned
Likelihood of Release		
1. Observed Release	550	—
2. Potential to Release:		
2a. Gas Potential to Release	500	—
2b. Particulate Potential to Release	500	—
2c. Potential to Release (higher of lines 2a and 2b)	500	—
3. Likelihood of Release (higher of lines 1 and 2c)	550	—
Waste Characteristics		
4. Toxicity/Mobility	(a)	—
5. Hazardous Waste Quantity	(a)	—
6. Waste Characteristics	100	—
Targets		
7. Nearest Individual	50	—
8. Population:		
8a. Level I Concentrations	(b)	—
8b. Level II Concentrations	(b)	—
8c. Potential Contamination	(b)	—
8d. Population (lines 8a+8b+8c)	(b)	—
9. Resources	5	—
10. Sensitive Environments		
10a. Actual Contamination	(c)	—
10b. Potential Contamination	(c)	—
10c. Sensitive Environments (lines 10a+10b)	(c)	—
11. Targets (lines 7+8d+9+10c)	(b)	—
Air Migration Pathway Score		
12. Pathway Score (S_a) [(lines 3×6×11)/82,500] [d]	100	—

[a] Maximum value applies to waste characteristics category.
[b] Maximum value not applicable.
[c] No specific maximum value applies to factor. However, pathway score based solely on sensitive environments is limited to maximum of 60.
[d] Do not round to nearest integer.

6.1 *Likelihood of Release.* Evaluate the likelihood of release factor category in terms of an observed release factor or a potential to release factor.

6.1.1 *Observed release.* Establish an observed release to the atmosphere by demonstrating that the site has released a hazardous substance to the atmosphere. Base this demonstration on either:

• Direct observation—a material (for example, particulate matter) that contains one or more hazardous substances has been seen entering the atmosphere directly. When evidence supports the inference of a release of a material that contains one or more hazardous substances by the site to the atmosphere, demonstrated adverse effects accumulated with that release may be used to establish an observed release.

• Chemical analysis—an analysis of air samples indicates that the concentration of ambient hazardous substance(s) has increased significantly above the background concentration for the site (see section 2.3). Some portion of the significant increase must be attributable to the site to establish the observed release.

If an observed release can be established, assign an observed release factor value of 550, enter this value in Table 6-1, and proceed to section 6.1.3. If an observed release cannot be established, assign an observed release factor value of 0, enter this value in Table 6-1, and proceed to section 6.1.2.

6.1.2 *Potential to release.* Evaluate potential to release only if an observed release cannot be established. Determine the potential to release factor value for the site by separately evaluating the gas potential to release and the particulate potential to release for each source at the site. Select the highest potential to release value (either gas or particulate) calculated for the sources evaluated and assign that value as the site potential to release factor value as specified below.

6.1.2.1 *Gas potential to release.* Evaluate gas potential to release for those sources that contain gaseous hazardous substances—that is, those hazardous substances with a vapor pressure greater than or equal to 10^{-6} torr.

Evaluate gas potential to release for each source based on three factors: gas containment, gas source type, and gas migration potential. Calculate the gas potential to release value as illustrated in Table 6-2. Combine sources with similar characteristics into a single source in evaluating the gas potential to release factors.

TABLE 6-2.—GAS POTENTIAL TO RELEASE EVALUATION

Source	Source type [a]	Gas containment factor value [b]	Gas source type factor value [c]	Gas migration potential factor value [d]	Sum	Gas source value
		A	B	C	(B+C)	A(B+C)
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
Gas Potential to Release Factor (Select the Highest Gas Source Value)						

[a] Enter a Source Type listed in Table 6-4.
[b] Enter Gas Containment Factor Value from section 6.1.2.1.1.
[c] Enter Gas Source Type Factor Value from section 6.1.2.1.2.
[d] Enter Gas Migration Potential Factor Value from section 6.1.2.1.3.

6.1.2.1.1 *Gas containment.* Assign each source a value from Table 6-3 for gas containment. Use the lowest value from Table 6-3 that applies to the source, except: assign a value of 10 if there is evidence of biogas release or if there is an active fire within the source.

TABLE 6-3.—GAS CONTAINMENT FACTOR VALUES

Gas containment description	Assigned value
All situations except those specifically listed below	10
Evidence of biogas release	10 [a]
Active fire within source	10 [a]
Gas collection/treatment system functioning, regularly inspected, maintained, and completely covering source	0
Source substantially surrounded by engineering windbreak and no other containment specifically described in this table applies	7
Source covered with essentially impermeable, regularly inspected, maintained cover	0
Uncontaminated soil cover >3 feet:	
• Source substantially vegetated with little exposed soil	0
• Source lightly vegetated with much exposed soil	3
• Source substantially devoid of vegetation	7
Uncontaminated soil cover ≥1 foot and ≤3 feet:	
• Source heavily vegetated with essentially no exposed soil	
—Cover soil type resistant to gas migration [b]	3
—Cover soil type not resistant to gas migration [b] or unknown	7
• Source substantially vegetated with little exposed soil and cover soil type resistant to gas migration [b]	7
• Other	10
Uncontaminated soil cover <1 foot:	
• Source heavily vegetated with essentially no exposed soil and cover soil type resistant to gas migration [b]	7
• Other	10
Totally or partially enclosed within structurally intact building and no other containment specifically described in this table applies	7
Source consists solely of intact, sealed containers:	
• Totally protected from weather by regularly inspected, maintained cover	0
• Other	3

[a] This value must be used if applicable.
[b] Consider moist fine-grained and saturated coarse-grained soils resistant to gas migration. Consider all other soils nonresistant.

6.1.2.1.2 *Gas source type.* Assign a value for gas source type to each source as follows:

• Determine if the source meets the minimum size requirement based on the source hazardous waste quantity value (see section 2.4.2.1.5). If the source receives a source hazardous waste quantity value of 0.5 or more, consider the source to meet the minimum size requirement.

• If the source meets the minimum size requirement, assign it a value from Table 6-4 for gas source type.

• If the source does not meet the minimum size requirement, assign it a value of 0 for gas source type.

If no source at the site meets the minimum size requirement, assign each source at the site a value from Table 6-4 for gas source type.

TABLE 6-4.—SOURCE TYPE FACTOR VALUES

Source type	Assigned value: Gas	Assigned value: Particulate
Active fire area	14	30
Burn pit	19	22
Containers or tanks (buried/below-ground):		
• Evidence of biogas release	33	22
• No evidence of biogas release	11	22
Containers or tanks, not elsewhere specified	28	14
Contaminated soil (excluding land treatment)	19	22
Landfarm/land treatment	28	22

TABLE 6-4.—SOURCE TYPE FACTOR VALUES—Concluded

Source type	Assigned value: Gas	Assigned value: Particulate
Landfill:		
• Evidence of biogas release	33	22
• No evidence of biogas release	11	22
Pile:		
• Tailings pile	6	28
• Scrap metal or junk pile	6	17
• Trash pile	6	6
• Chemical waste pile	11	28
• Other waste piles	17	28
Surface impoundments (buried/backfilled):		
• Evidence of biogas release	33	22
• No evidence of biogas release	11	22
Surface impoundment (not buried/backfilled):		
• Dry	19	22
• Other	28	0
Other types of sources, not elsewhere specified	0	0

6.1.2.1.3 *Gas migration potential.* Evaluate this factor for each source as follows:

• Assign a value for gas migration potential to each of the gaseous hazardous substances associated with the source (see section 2.2.2) as follows:

–Assign values from Table 6-5 for vapor pressure and Henry's constant to each hazardous substance. If Henry's constant cannot be determined for a hazardous substance, assign that hazardous substance a value of 2 for the Henry's constant component.

–Sum the two values assigned to the hazardous substance.

–Based on this sum, assign the hazardous substance a value from Table 6-6 for gas migration potential.

• Assign a value for gas migration potential to each source as follows:

–Select three hazardous substances associated with the source:

—If more than three gaseous hazardous substances can be associated with the source, select three that have the highest gas migration potential values.

—If fewer than three gaseous hazardous substances can be associated with a source, select all of them.

–Average the gas migration potential values assigned to the selected hazardous substances.

–Based on this average value, assign the source a gas migration potential value from Table 6-7.

TABLE 6-5.—VALUES FOR VAPOR PRESSURE AND HENRY'S CONSTANT

Vapor pressure (Torr)	Assigned value
Greater than 10	3
Greater than 10^{-3} to 10	2
10^{-5} to 10^{-3}	1
Less than 10^{-5}	0

Henry's constant (atm-m³/mol)	Assigned value
Greater than 10^{-3}	3
Greater than 10^{-5} to 10^{-3}	2
10^{-7} to 10^{-5}	1
Less than 10^{-7}	0

TABLE 6-6.—GAS MIGRATION POTENTIAL VALUES FOR A HAZARDOUS SUBSTANCE

Sum of values for vapor pressure and Henry's constant	Assigned value
0	0
1 or 2	6
3 or 4	11
5 or 6	17

TABLE 6-7.—GAS MIGRATION POTENTIAL VALUES FOR THE SOURCE

Average of gas migration potential values for three hazardous substances [a]	Assigned value
0 to < 3	0
3 to < 8	6

TABLE 6-7.—GAS MIGRATION POTENTIAL VALUES FOR THE SOURCE—Concluded

Average of gas migration potential values for three hazardous substances [a]	Assigned value
8 to < 14	11
14 to 17	17

[a] If fewer than three hazardous substances can be associated with the source, compute the average based only on those hazardous substances that can be associated.

6.1.2.1.4 *Calculation of gas potential to release value.* Determine the gas potential to release value for each source as illustrated in Table 6-2. For each source, sum the gas source type factor value and gas migration potential factor value and multiply this sum by the gas containment factor value. Select the highest product calculated for the sources evaluated and assign it as the gas potential to release value for the site. Enter this value in Table 6-1.

6.1.2.2 *Particulate potential to release.* Evaluate particulate potential to release for those sources that contain particulate hazardous substances—that is, those hazardous substances with a vapor pressure less than or equal to 10^{-1} torr.

Evaluate particulate potential to release for each source based on three factors: particulate containment, particulate source type, and particulate migration potential. Calculate the particulate potential to release value as illustrated in Table 6-8. Combine sources with similar characteristics into a single source in evaluating the particulate potential to release factors.

6.1.2.2.1 *Particulate containment.* Assign each source a value from Table 6-9 for particulate containment. Use the lowest value from Table 6-9 that applies to the source.

6.1.2.2.2 *Particulate source type.* Assign a value for particulate source type to each source in the same manner as specified for gas sources in section 6.1.2.1.2.

6.1.2.2.3 *Particulate migration potential.* Based on the site location, assign a value from Figure 6-2 for particulate migration potential. Assign this same value to each source at the site.

TABLE 6-8.—PARTICULATE POTENTIAL TO RELEASE EVALUATION

Source	Source type [a]	Particulate containment factor value [b]	Particulate type factor value [c]	Particulate migration potential factor value [d]	Sum	Particulate source value
		A	B	C	(B+C)	A (B+C)
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
Particulate Potential to Release Factor Value (Select Highest Particulate Source Value)						

[a] Enter a Source Type listed in Table 6-4.
[b] Enter Particulate Containment Factor Value from section 6.1.2.2.1.
[c] Enter Particulate Source Type Factor Value from section 6.1.2.2.2.
[d] Enter Particulate Migration Potential Factor Value from section 6.1.2.2.3.

TABLE 6-9.—PARTICULATE CONTAINMENT FACTOR VALUES

Particulate containment description	Assigned value
All situations except those specifically listed below	10
Source contains only particulate hazardous substances totally covered by liquids	0
Source substantially surrounded by engineered windbreak and no other containment specifically described in this table applies	7
Source covered with essentially impermeable, regularly inspected, maintained cover	0
Uncontaminated soil cover > 3 feet:	
• Source substantially vegetated with little or no exposed soil	0
• Source lightly vegetated with much exposed soil	3
• Source substantially devoid of vegetation	7
Uncontaminated soil cover ≥ 1 foot and ≤ 3 feet:	
• Source heavily vegetated with essentially no exposed soil:	
—Cover soil type resistant to gas migration [a]	3
—Cover soil type not resistant to gas migration [a] or unknown	7
• Source substantially vegetated with little exposed soil and cover soil type resistant to gas migration [a]	7
• Other	10
Uncontaminated soil cover < 1 foot:	
• Source heavily vegetated with essentially no exposed soil and cover soil type resistant to gas migration [a]	7
• Other	10
Totally or partially enclosed within structurally intact building and no other containment specifically described in this table applies	7
Source consists solely of containers:	
• All containers contain only liquids	0
• All containers intact, sealed, and totally protected from weather by regularly inspected, maintained cover	0
• All containers intact and sealed	3
• Other	10

[a] Consider moist fine-grained and saturated coarse-grained soils resistant to gas migration. Consider all other soils nonresistant.

BILLING CODE 6560-50-M

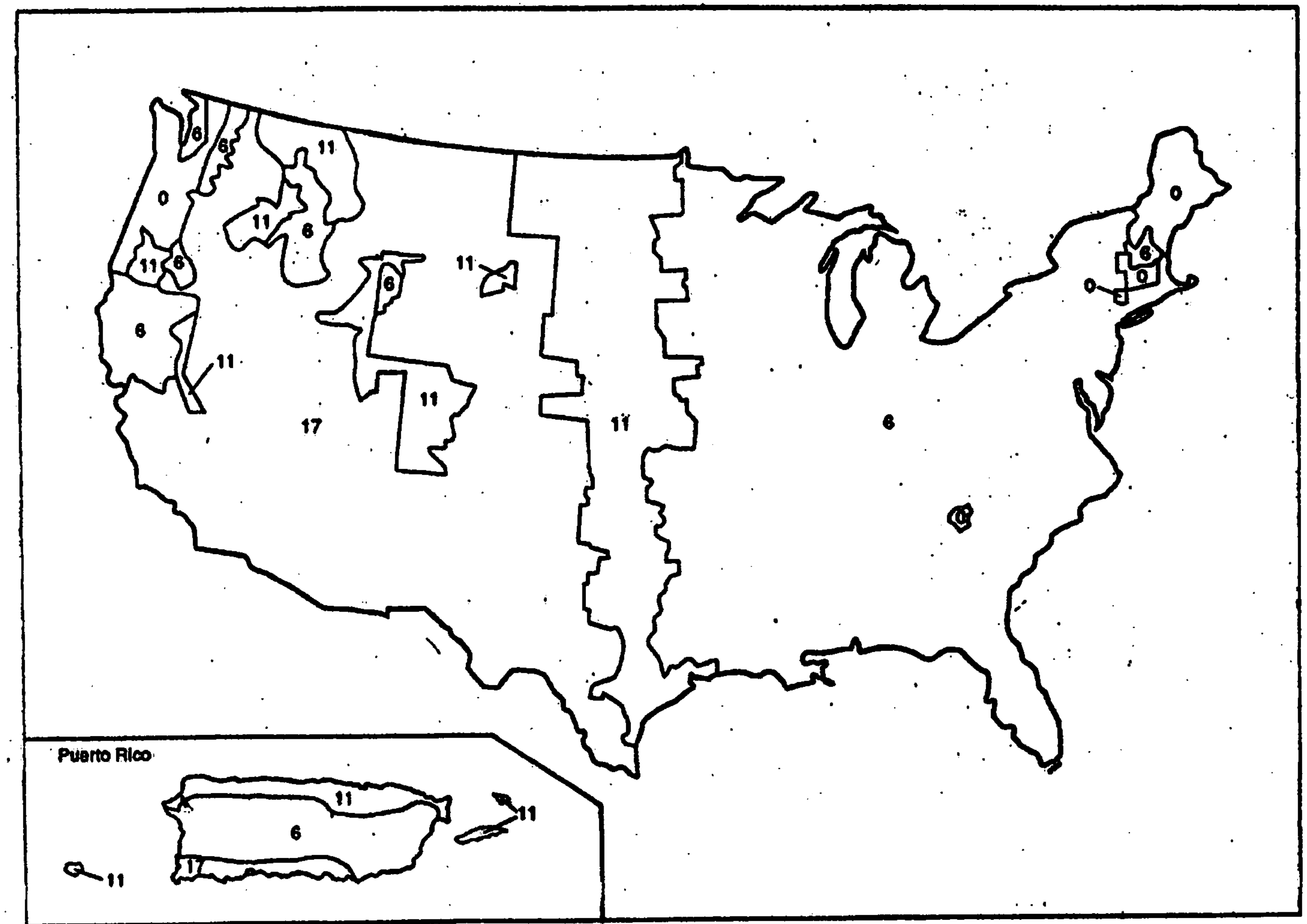


FIGURE 6-2
PARTICULATE MIGRATION POTENTIAL FACTOR VALUES

BILLING CODE 6560-50-C

FIGURE 6-2.—PARTICULATE MIGRATION POTENTIAL FACTOR VALUES—CONCLUDED

Location	Particulate migration potential assigned value
Hawaiian Islands	
Hilo, Hawaii	0
Honolulu, Oahu	17
Kahului, Maui	17
Lanai	17
Lihue, Kauai	11
Molokai	17
Pacific Islands	
Guam	6
Johnston Island	17
Koror Island	0
Kwajalein Island	6
Majuro, Marshall Islands	0
Pago Pago, American Samoa	0
Ponape Island	0
Truk, Caroline Islands	0
Wake Island	17
Yap Island	0
Alaska	
Anchorage	17
Annette	0
Barrow	17
Barter Island	17
Bethel	17
Bettles	17
Big Delta	17
Cold Bay	6
Fairbanks	17
Gulkana	17
Homer	11
Juneau	0
King Salmon	11
Kodiak	0
Kotzebue	17
McGrath	17
Nome	11
St. Paul Island	11
Talkeetna	6
Unalakleet	17
Valdez	0
Yakutat	0
American Virgin Islands	
St. Croix	17
St. John	11
St. Thomas	11
Puerto Rico	
Arecibo	6
Coloso	6
Fajardo	11
Humacao	6
Isabela Station	11
Ponce	17
San Juan	11

For site locations not on Figure 6-2, and for site locations near the boundary points on Figure 6-2, assign a value as follows. First, calculate a Thornthwaite P-E index using the following equation:

$$PE = \sum_{i=1}^{12} 115\,[P_i/(T_i-10)]^{10/9}$$

where:

PE=Thornthwaite P-E index.

P_i=Mean monthly precipitation for month i, in inches.

T_i=Mean monthly temperature for month i, in degrees Fahrenheit; for any month having a mean monthly temperature less than 28.4 °F, use 28.4 °F.

Based on the calculated Thornthwaite P-E index, assign a source particulate migration potential value to the site from Table 6-10. Assign this same value to each source at the site.

TABLE 6-10.—PARTICULATE MIGRATION POTENTIAL VALUES

Thornthwaite P-E index	Assigned value
Greater than 150	0
85 to 150	6
50 to less than 85	11
Less than 50	17

6.1.2.2.4 *Calculation of particulate potential to release value.* Determine the particulate potential to release value for each source as illustrated in Table 6-8. For each source, sum its particulate source type factor value and particulate migration potential factor value and multiply this sum by its particulate containment factor value. Select the highest product calculated for the sources evaluated and assign it as the particulate potential to release value for the site. Enter the value in Table 6-1.

6.1.2.3 *Calculation of potential to release factor value for the site.* Select the higher of the gas potential to release value assigned in section 6.1.2.1.4 and the particulate potential to release value assigned in section 6.1.2.2.4. Assign the value selected as the site potential to release factor value. Enter this value in Table 6-1.

6.1.3 *Calculation of likelihood of release factor category value.* If an observed release is established, assign the observed release factor value of 550 as the likelihood of release factor category value. Otherwise, assign the site potential to release factor value as the likelihood of release factor category value. Enter the value in Table 6-1.

6.2 *Waste characteristics.* Evaluate the waste characteristics factor category based on two factors: toxicity/mobility and hazardous waste quantity. Evaluate only those hazardous substances available to migrate from the sources at the site to the atmosphere. Such hazardous substances include:

- Hazardous substances that meet the criteria for an observed release to the atmosphere.
- All gaseous hazardous substances associated with a source that has a gas containment factor value greater than 0 (see section 2.2.2, 2.2.3, and 6.1.2.1.1).
- All particulate hazardous substances associated with a source that has a particulate containment factor value greater than 0 (see section 2.2.2, 2.2.3, and 6.1.2.2.1).

6.2.1 *Toxicity/mobility.* For each hazardous substance, assign a toxicity factor value, a mobility factor value, and a combined toxicity/mobility factor value as specified below. Select the toxicity/mobility factor value for the air migration pathway as specified in section 6.2.1.3.

6.2.1.1 *Toxicity.* Assign a toxicity factor value to each hazardous substance as specified in section 2.4.1.1.

6.2.1.2 *Mobility.* Assign a mobility factor value to each hazardous substance as follows:

- Gaseous hazardous substance.
  - —Assign a mobility factor value of 1 to each gaseous hazardous substance that meets the criteria for an observed release to the atmosphere.
  - —Assign a mobility factor value from Table 6-11, based on vapor pressure, to each gaseous hazardous substance that does not meet the criteria for an observed release.
- Particulate hazardous substance.
  - —Assign a mobility factor value of 0.02 to each particulate hazardous substance that meets the criteria for an observed release to the atmosphere.
  - —Assign a mobility factor value from Figure 6-3, based on the site's location, to each particulate hazardous substance that does not meet the criteria for an observed release. (Assign all such particulate hazardous substances this same value.)
  - —For site locations not on Figure 6-3 and for site locations near the boundary points on Figure 6-3, assign a mobility factor value to each particulate hazardous substance that does not meet the criteria for an observed release as follows:
    - —Calculate a value M:

      $M=0.0182\,(U^3/[PE]^2)$

      where:

      U=Mean average annual wind speed (meters per second).

      PE=Thornthwaite P-E index from section 6.1.2.2.3.
    - —Based on the value M, assign a mobility factor value from Table 6-12 to each particulate hazardous substance.
- Gaseous and particulate hazardous substances.
  - —For a hazardous substance potentially present in both gaseous and particulate forms, select the higher of the factor values for gas mobility and particulate mobility for that substance and assign that value as the mobility factor value for the hazardous substance.

6.2.1.3 *Calculation of toxicity/mobility factor value.* Assign each hazardous substance a toxicity/mobility factor value from Table 6-13, based on the values assigned to the hazardous substance for the toxicity and mobility factors. Use the hazardous substance with the highest toxicity/mobility factor value to assign a value to the toxicity/mobility factor for the air migration pathway. Enter this value in Table 6-1.

TABLE 6-11.—GAS MOBILITY FACTOR VALUES

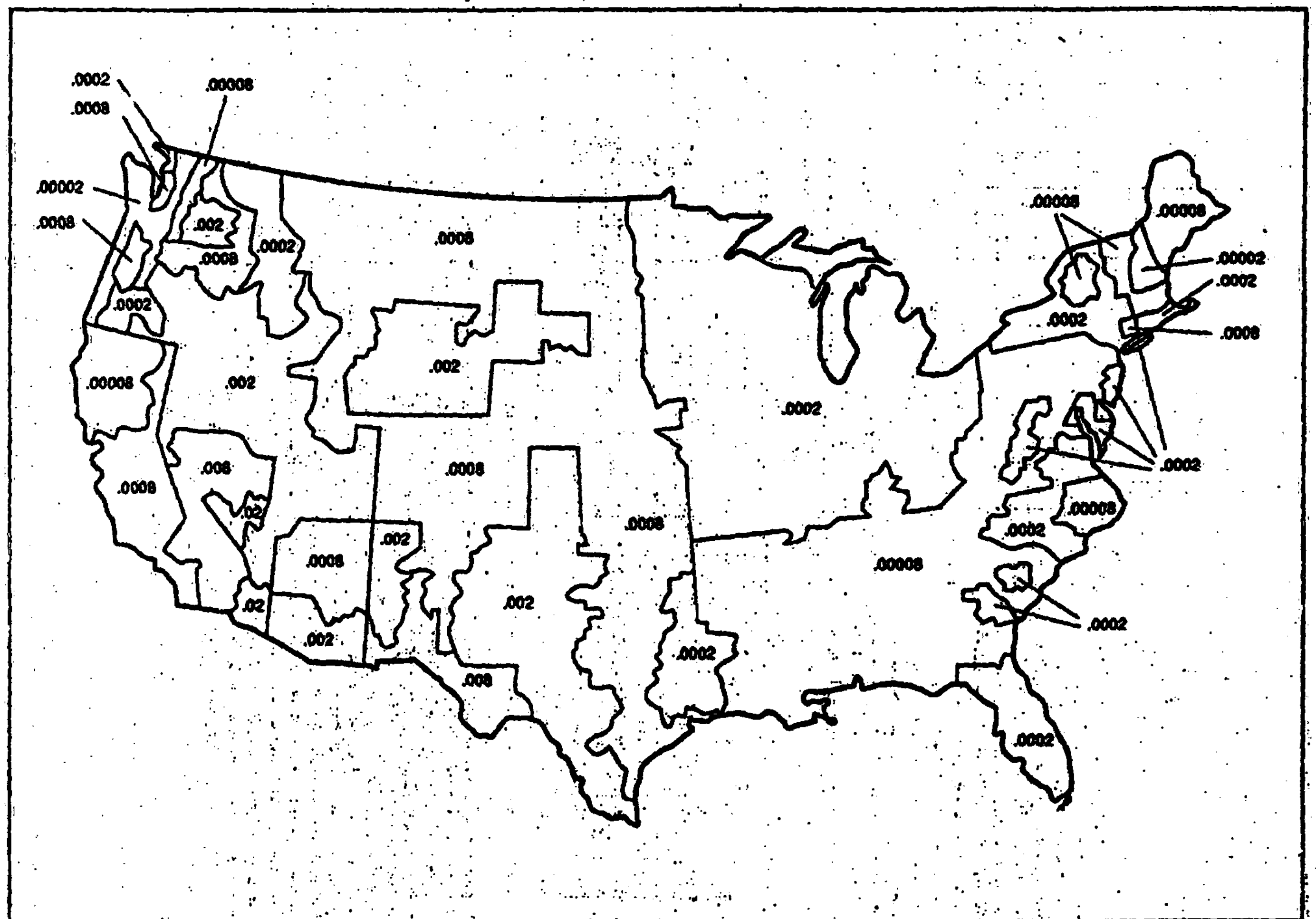
Vapor pressure (Torr)	Assigned value [a]
Greater than 10^{-1}	1.0
Greater than 10^{-3} to 10^{-1}	0.2
Greater than 10^{-5} to 10^{-3}	0.02

TABLE 6-11.—GAS MOBILITY FACTOR VALUES—Concluded

Vapor pressure (Torr)	Assigned value [a]
Greater than 10^{-7} to 10^{-5}	0.002
Less than or equal to 10^{-7}	0.0002

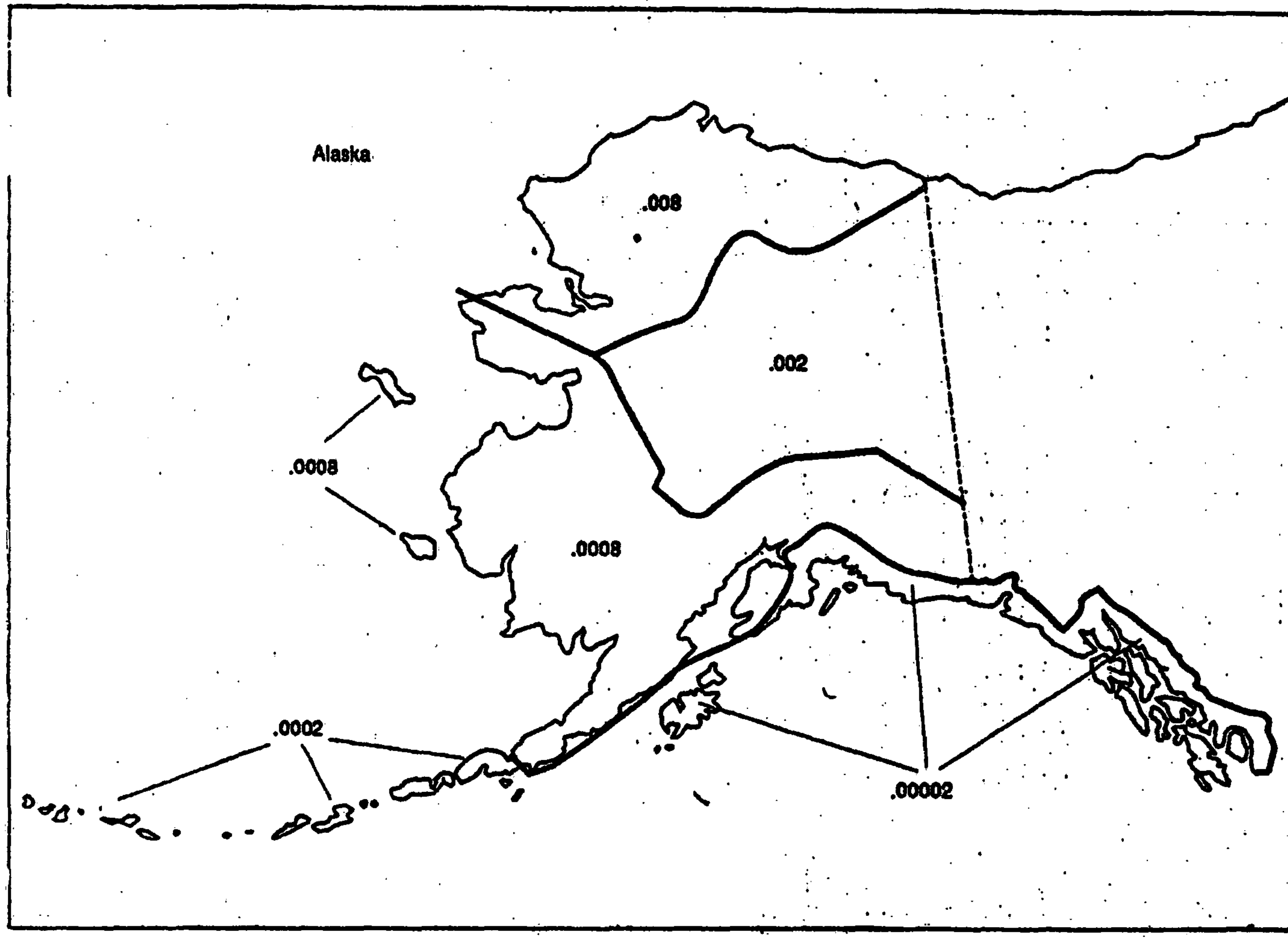
[a] Do not round to nearest integer.

BILLING CODE 6560-50-M



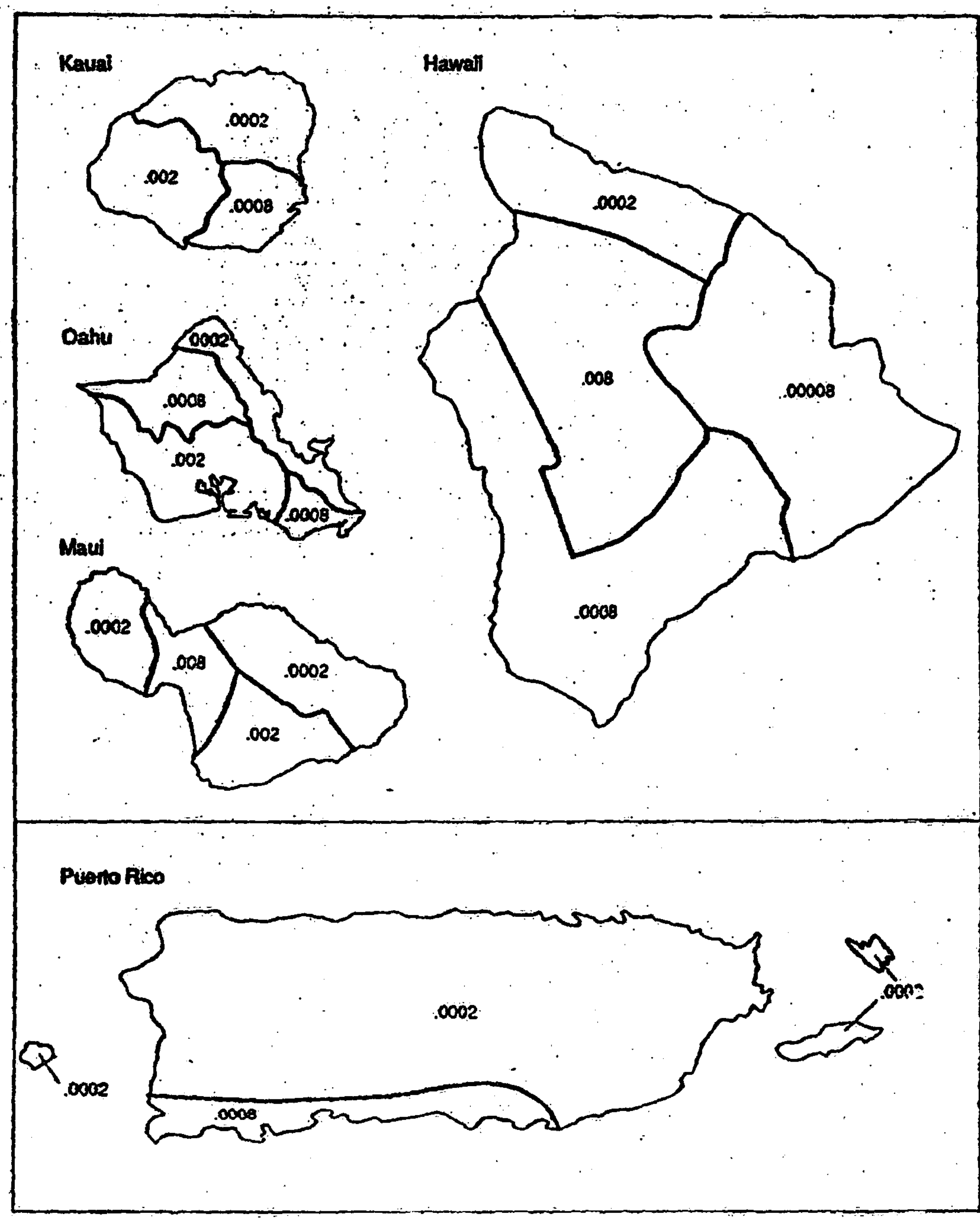
[a] Do not round to nearest integer.

FIGURE 6-3
PARTICULATE MOBILITY FACTOR VALUES[a]



[a] Do not round to nearest integer.

FIGURE 6-3
PARTICULATE MOBILITY FACTOR VALUES[a]
(CONTINUED)



[a] Do not round to nearest integer.

FIGURE 6-3
PARTICULATE MOBILITY FACTOR VALUES[a]
(CONTINUED)

BILLING CODE 6560-50-C

FIGURE 6-3. PARTICULATE MOBILITY FACTOR VALUES—CONTINUED

Location	Particulated mobility assigned value
Pacific Islands	
Guam	0.0002
Johnston Island	0.002
Koror Island	0.00006
Kwajalein Island	0.0002
Majuro, Marshall Islands	0.00006
Pago Pago, American Samoa	0.00006
Ponape Island	0.00002
Truk, Caroline Islands	0.00006
Wake Island	0.002
Yap Island	0.00006

FIGURE 6-3.—PARTICULATE MOBILITY FACTOR VALUES—CONCLUDED

Location	Particulated mobility assigned value
American Virgin Islands	
St. Croix	0.0006
St. John	0.0002
St. Thomas	0.0002

TABLE 6-12.—PARTICULATE MOBILITY FACTOR VALUES

M	Assigned value[a]
Greater than 1.4×10^{-2}	0.02
Greater than 4.4×10^{-3} to 1.4×10^{-2}	0.006
Greater than 1.4×10^{-3} to 4.4×10^{-3}	0.002
Greater than 4.4×10^{-4} to 1.4×10^{-3}	0.0006
Greater than 1.4×10^{-4} to 4.4×10^{-4}	0.0002
Greater than 4.4×10^{-5} to 1.4×10^{-4}	0.00006
Less than or equal to 4.4×10^{-5}	0.00002

[a] Do not round to nearest integer.

TABLE 6-13.—TOXICITY/MOBILITY FACTOR VALUES[a]

Mobility factor value	Toxicity factor value					
	10,000	1,000	100	10	1	0
1.0	10,000	1,000	100	10	1	0
0.2	2,000	200	20	2	0.2	0
0.02	200	20	2	0.2	0.02	0
0.006	60	6	0.6	0.06	0.006	0
0.002	20	2	0.2	0.02	0.002	0
0.0006	6	0.6	0.06	0.006	0.0006	0
0.0002	2	0.2	0.02	0.002	0.0002	0
0.00006	0.6	0.06	0.006	0.0006	0.00006	0
0.00002	0.2	0.02	0.002	0.0002	0.00002	0

[a] Do not round to nearest integer.

6.2.2 *Hazardous waste quantity.* Assign a hazardous waste quantity factor value for the air migration pathway as specified in section 2.4.2. Enter this value in Table 6-1.

6.2.3 *Calculation of waste characteristics factor category value.* Multiply the toxicity/mobility factor value and the hazardous waste quantity factor value, subject to a maximum product of 1×10^8. Based on this product, assign a value from Table 2-7 (section 2.4.3.1) to the waste characteristics factor category. Enter this value in Table 6-1.

6.3 *Targets.*

Evaluate the targets factor category based on four factors: nearest individual, population, resources, and sensitive environments. Include only those targets (for example, individuals, sensitive environments) located within the 4-mile target distance limit, except: if an observed release is established beyond the 4-mile target distance limit, include those additional targets that are specified below in this section and in section 6.3.4.

Evaluate the nearest individual and population factors based on whether the target populations are subject to Level I concentrations, Level II concentrations, or potential contamination. Determine which applies to a target population as follows.

If no samples meet the criteria for an observed release to air and if there is no observed release by direct observation, consider the entire population within the 4-mile target distance limit to be subject to potential contamination.

If one or more samples meet the criteria for an observed release to air or if there is an observed release by direct observation, evaluate the population as follows:

- Determine the most distant sample location that meets the criteria for Level I concentrations as specified in sections 2.5.1 and 2.5.2 and the most distant location (that is, sample location or direct observation location) that meets the criteria for Level II concentrations. Use the health-based benchmarks from Table 6-14 in determining the level of contamination for sample locations. If the most distant Level II location is closer to a source than the most distant Level I sample location, do not consider the Level II location.
- Determine the single most distant location (sample location or direct observation location) that meets the criteria for Level I or Level II concentrations.
- If this single most distant location is within the 4-mile target distance limit, identify the distance categories from Table 6-15 in which the selected Level I concentrations sample and Level II concentrations sample (or direct observation location) are located:
  - –Consider the target population anywhere within this furthest Level I distance category, or anywhere within a distance category closer to a source at the site, as subject to Level I concentrations.
  - –Consider the target population located beyond any Level I distance categories, up to and including the population anywhere within the furthest Level II distance category, as subject to Level II concentrations.
  - –Consider the remainder of the target population within the 4-mile target distance limit as subject to potential contamination.
- If the single most distant location is beyond the 4-mile target distance limit, identify the distance at which the selected Level I concentrations sample and Level II concentrations sample (or direct observation location) are located:
  - –If the Level I sample location is within the 4-mile target distance limit, identify the target population subject to Level I concentrations as specified above.
  - –If the Level I sample location is beyond the 4-mile target distance limit, consider the target population located anywhere within a distance from the sources at the site equal to the distance to this sample location to be subject to Level I concentrations and include them in the evaluation.
  - –Consider the target population located beyond the Level I target population, but located anywhere within a distance from the sources at the site equal to the distance to the selected Level II location, to be subject to Level II concentrations and include them in the evaluation.

–Do not include any target population as subject to potential contamination.

TABLE 6–14.—HEALTH-BASED BENCHMARKS FOR HAZARDOUS SUBSTANCES IN AIR

- Concentration corresponding to National Ambient Air Quality Standard (NAAQS).
- Concentration corresponding to National Emission Standards for Hazardous Air Pollutants (NESHAPs).
- Screening concentration for cancer corresponding to that concentration that corresponds to the 10^{-6} individual cancer risk for inhalation exposures.
- Screening concentration for noncancer toxicological responses corresponding to the Reference Dose (RfD) for inhalation exposures.

TABLE 6–15.—AIR MIGRATION PATHWAY DISTANCE WEIGHTS

Distance category (miles)	Assigned distance weight[a]
0	1.0
Greater than 0 to ¼	0.25
Greater than ¼ to ½	0.054
Greater than ½ to 1	0.016
Greater than 1 to 2	0.0051
Greater than 2 to 3	0.0023
Greater than 3 to 4	0.0014
Greater than 4	0

[a] Do not round to nearest integer.

6.3.1 *Nearest individual.* Assign the nearest individual factor a value as follows:

- If one or more residences or regularly occupied buildings or areas is subject to Level I concentrations as specified in section 6.3, assign a value of 50.
- If not, but if one or more a residences or regularly occupied buildings or areas is subject to Level II concentrations, assign a value of 45.
- If none of the residences and regularly occupied buildings and areas is subject to Level I or Level II concentrations, assign a value to this factor based on the shortest distance to any residence or regularly occupied building or area, as measured from any source at the site with an air migration containment factor value greater than 0. Based on this shortest distance, assign a value from Table 6–16 to the nearest individual factor.

Enter the value assigned in Table 6–1.

TABLE 6–16.—NEAREST INDIVIDUAL FACTOR VALUES

Distance to nearest individual (miles)	Assigned value
Level I concentrations[a]	50
Level II concentrations[a]	45
0 to ⅛	20
Greater than ⅛ to ¼	7
Greater than ¼ to 1/2	2
Greater than ½ to 1	1
Greater than 1	0

[a] Distance does not apply.

6.3.2 *Population.* In evaluating the population factor, count residents, students, and workers regularly present within the target distance limit. Do not count transient populations such as customers and travelers passing through the area.

In estimating residential population, when the estimate is based on the number of residences, multiply each residence by the average number of persons per residence for the county in which the residence is located.

6.3.2.1 *Level of contamination.* Evaluate the population factor based on three factors: Level I concentrations, Level II concentrations, and potential contamination.

Evaluate the population subject to Level I concentrations (see section 6.3) as specified in section 6.3.2.2, the population subject to Level II concentrations as specified in section 6.3.2.3, and the population subject to potential contamination as specified in section 6.3.2.4.

For the potential contamination factor, use population ranges in evaluating the factor as specified in section 6.3.2.4. For the Level I and Level II concentrations factors, use the population estimate, not population ranges, in evaluating both factors.

6.3.2.2 *Level I concentrations.* Sum the number of people subject to Level I concentrations. Multiply this sum by 10. Assign the product as the value for this factor. Enter this value in Table 6–1.

6.3.2.3 *Level II concentrations.* Sum the number of people subject to Level II concentrations. Do not include those people already counted under the Level I concentrations factor. Assign this sum as the value for this factor. Enter this value in Table 6–1.

6.3.2.4 *Potential contamination.* Determine the number of people within each distance category of the target distance limit (see Table 6–15) who are subject to potential contamination. Do not include those people already counted under the Level I and Level II concentrations factors.

Based on the number of people present within a distance category, assign a distance-weighted population value for that distance category from Table 6–17. (Note that the distance-weighted population values in Table 6–17 incorporate the distance weights from Table 6–15. Do not multiply the values from Table 6–17 by these distance weights.)

Calculate the potential contamination factor value (PI) as follows:

$$PI = \frac{1}{10} \sum_{i=1}^{n} W_i$$

where:

W_i=Distance-weighted population from Table 6–17 for distance category i.

n=Number of distance categories.

If PI is less than 1, do not round it to the nearest integer; if PI is 1 or more, round to the nearest integer. Enter this value in Table 6–1.

6.3.2.5 *Calculation of population factor value.* Sum the factor values for Level I concentrations, Level II concentrations, and potential contamination. Do not round this sum to the nearest integer. Assign this sum as the population factor value. Enter this value in Table 6–1.

TABLE 6–17.—DISTANCE-WEIGHTED POPULATION VALUES FOR POTENTIAL CONTAMINATION FACTOR FOR AIR PATHWAY[a]

Distance category (miles)	Number of people within the distance category												
	0	1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,000	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	1,000,001 to 3,000,000
On a source	0	4	17	53	164	522	1,633	5,214	16,325	52,137	163,246	521,360	1,632,455
Greater than 0 to ¼	0	1	4	13	41	131	408	1,304	4,081	13,034	40,812	130,340	408,114
Greater than ¼ to ½	0	0.2	0.9	3	9	28	88	282	882	2,815	8,815	28,153	88,153
Greater than ½ to 1	0	0.06	0.3	0.9	3	8	26	83	261	834	2,612	8,342	26,119
Greater than 1 to 2	0	0.02	0.09	0.3	0.8	3	8	27	83	266	833	2,659	8,326
Greater than 2 to 3	0	0.009	0.04	0.1	0.4	1	4	12	38	120	375	1,199	3,755
Greater than 3 to 4	0	0.005	0.02	0.07	0.2	0.7	2	7	23	73	229	730	2,285

[a] Round the number of people present within a distance category to nearest integer. Do not round the assigned distance-weighted population value to nearest integer.

6.3 *Resources.* Evaluate the resources factor as follows:

- Assign a value of 5 if one or more of the following resources are present within one-half mile of a source at the site having an air migration containment factor value greater than 0:

—Commercial agriculture.

—Commercial silviculture.

—Major or designated recreation area.

• Assign a value of 0 if none of these resources is present.

Enter the value assigned in Table 6–1.

6.3.4 *Sensitive environments.* Evaluate sensitive environments based on two factors: actual contamination and potential contamination. Determine which factor applies as follows.

If no samples meet the criteria for an observed release to air and if there is no observed release by direct observation, consider all sensitive environments located, partially or wholly, within the target distance limit to be subject to potential contamination.

If one or more samples meet the criteria for an observed release to air or if there is an observed release by direct observation, determine the most distant location (that is, sample location or direct observation location) that meets the criteria for an observed release:

• If the most distant location meeting the criteria for an observed release is within the 4-mile target distance limit, identify the distance category from Table 6–15 in which it is located:

—Consider sensitive environments located, partially or wholly, anywhere within this distance category or anywhere within a distance category closer to a source at the site as subject to actual contamination.

—Consider all other sensitive environments located, partially or wholly, within the target distance limit as subject to potential contamination.

• If the most distant location meeting the criteria for an observed release is beyond the 4-mile target distance limit, identify the distance at which it is located:

—Consider sensitive environments located, partially or wholly, anywhere within a distance from the sources at the site equal to the distance to this location to be subject to actual contamination and include all such sensitive environments in the evaluation.

—Do not include any sensitive environments as subject to potential contamination.

6.3.4.1 *Actual contamination.* Determine those sensitive environments subject to actual contamination (i.e., those located partially or wholly within a distance category subject to actual contamination). Assign value(s) from Table 4–23 (section 4.1.4.3.1.1) to each sensitive environment subject to actual contamination.

For those sensitive environments that are wetlands, assign an additional value from Table 6–18. In assigning a value from Table 6–18, include only those portions of wetlands located within distance categories subject to actual contamination. If a wetland is located partially in a distance category subject to actual contamination and partially in one subject to potential contamination, then solely for purposes of Table 6–18, count the portion in the distance category subject to potential contamination under the potential contamination factor in section 6.3.4.2. Determine the total acreage of wetlands within those distance categories subject to actual contamination and assign a value from Table 6–18 based on this total acreage.

Calculate the actual contamination factor value (EA) as follows:

$$EA = WA + \sum_{i=1}^{n} S_i$$

where:

WA=Value assigned from Table 6–18 for wetlands in distance categories subject to actual contamination.

S_i=Value(s) assigned from Table 4–23 to sensitive environment i.

n=Number of sensitive environments subject to actual contamination.

Enter the value assigned in Table 6–1.

TABLE 6–18.—WETLANDS RATING VALUES FOR AIR MIGRATION PATHWAY [a]

Wetland area (acres)	Assigned value
Less than 1	0
1 to 50	25
Greater than 50 to 100	75
Greater than 100 to 150	125
Greater than 150 to 200	175
Greater than 200 to 300	250
Greater than 300 to 400	350
Greater than 400 to 500	450
Greater than 500	500

[a] Wetlands as defined in 40 CFR section 230.3.

6.3.4.2 *Potential contamination.* Determine those sensitive environments located, partially or wholly, within the target distance limit that are subject to potential contamination. Assign value(s) from Table 4–23 to each sensitive environment subject to potential contamination. Do not include those sensitive environments already counted for Table 4–23 under the actual contamination factor.

For each distance category subject to potential contamination, sum the value(s) assigned from Table 4–23 to the sensitive environments in that distance category. If a sensitive environment is located in more than one distance category, assign the sensitive environment only to that distance category having the highest distance weighting value from Table 6–15.

For those sensitive environments that are wetlands, assign an additional value from Table 6–18. In assigning a value from Table 6–18, include only those portions of wetlands located within distance categories subject to potential contamination, as specified in section 6.3.4.1. Treat the wetlands in each separate distance category as separate sensitive environments solely for purposes of applying Table 6–18. Determine the total acreage of wetlands within each of these distance categories and assign a separate value from Table 6–18 for each distance category.

Calculate the potential contamination factor value (EP) as follows:

$$EP = \frac{1}{10} \sum_{j=1}^{m} ([W_j + S_j]D_j)$$

Where:

$$S_j = \sum_{i=1}^{n} S_{ij}$$

S_{ij}=Value(s) assigned from Table 4–23 to sensitive environment i in distance category j.

n=Number of sensitive environments subject to potential contamination.

W_j=Value assigned from Table 6–18 for wetland area in distance category j.

D_j=Distance weight from Table 6–15 for distance category j.

m=Number of distance categories subject to potential contamination.

If EP is less than 1, do not round it to the nearest integer; if EP is 1 or more, round to the nearest integer. Enter the value assigned in Table 6–1.

6.3.4.3 *Calculation of sensitive environments factor value.* Sum the factor values for actual contamination and potential contamination. Do not round this sum, designated as EB, to the nearest integer.

Because the pathway score based solely on sensitive environments is limited to a maximum of 60, use the value EB to determine the value for the sensitive environments factor as follows:

• Multiply the values assigned to likelihood of release (LR), waste characteristics (WC), and EB. Divide the product by 82,500.

—If the result is 60 or less, assign the value EB as the sensitive environments factor value.

—If the result exceeds 60, calculate a value EC as follows:

$$EC = \frac{(60)(82{,}500)}{(LR)(WC)}$$

Assign the value EC as the sensitive environments factor value. Do not round this value to the nearest integer.

Enter the value assigned for the sensitive environments factor in Table 6–1.

6.3.5 *Calculation of targets factor category value.* Sum the nearest individual, population, resources, and sensitive environments factor values. Do not round this sum to the nearest integer. Assign this sum as the targets factor category value. Enter this value in Table 6–1.

6.4 *Calculation of air migration pathway score.* Multiply the values for likelihood of release, waste characteristics, and targets, and round the product to the nearest integer. Then divide by 82,500. Assign the resulting value, subject to a maximum value of 100, as the air migration pathway score (S_a). Enter this score in Table 6–1.

7.0 Sites Containing Radioactive Substances.

In general, radioactive substances are hazardous substances under CERCLA and should be considered in HRS scoring. Releases of certain radioactive substances are, however, excluded from the definition of "release" in section 101(22) of CERCLA, as amended, and should not be considered in HRS scoring.

Evaluate sites containing radioactive substances using the instructions specified in sections 2 through 6, supplemented by the instructions in this section. Those factors denoted with a "yes" in Table 7-1 are evaluated differently for sites containing radioactive substances than for sites containing only nonradioactive hazardous substances, while those denoted with a "no" are not evaluated differently and are not addressed in this section.

TABLE 7-1.—HRS FACTORS EVALUATED DIFFERENTLY FOR RADIONUCLIDES

Ground water pathway	Status [a]	Surface water pathway	Status [a]	Soil exposure pathway	Status [a]	Air pathway	Status [a]
Likelihood of Release		**Likelihood of Release**		**Likelihood of Exposure**		**Likelihood of Release**	
Observed Release	Yes	Observed Release	Yes	Observed Contamination	Yes	Observed Release	Yes
Potential to Release	No	Potential to Release	No	Attractiveness/Accessibility to Nearby Residents	No	Gas Potential to Release	No
Containment	No	Overland Flow Containment	No			Gas Containment	No
Net Precipitation	No	Runoff	No	Area of Contamination	No	Gas Source Type	No
Depth to Aquifer	No	Distance to Surface Water	No			Gas Migration Potential	No
Travel Time	No	Flood Frequency	No			Particulate Potential to Release	No
		Flood Containment	No			Particulate Containment	No
						Particulate Source Type	No
						Particulate Migration Potential	No
Waste Characteristics		**Waste Characteristics**		**Waste Characteristics**		**Waste Characteristics**	
Toxicity	Yes	Toxicity/Ecotoxicity	Yes/Yes	Toxicity	Yes	Toxicity	Yes
Mobility	No	Persistence/Mobility	Yes/No	Hazardous Waste Quantity	Yes	Mobility	No
Hazardous Waste Quantity	Yes	Bioaccumulation Potential	No			Hazardous Waste Quantity	Yes
		Hazardous Waste Quantity	Yes				
Targets		**Targets**		**Targets**		**Targets**	
Nearest Well	Yes [b]	Nearest Intake	Yes [b]	Resident Individual	Yes [b]	Nearest Individual	Yes [b]
Population	Yes [b]	Drinking Water Population	Yes [b]	Resident Population	Yes [b]	Population	Yes [b]
Resources	No	Resources	No	Workers	No	Resources	No
Wellhead Protection Area	No	Sensitive Environments	Yes [b]	Resources	No	Sensitive Environments	No
		Human Food Chain Individual	Yes [b]	Terrestrial Sensitive Environments	No		
		Human Food Chain Population	Yes [b]				
				Nearby Individual	No		
				Population Within 1 Mile	No		

[a] Factors evaluated differently are denoted by "yes"; factors not evaluated differently are denoted by "no."
[b] Difference is in the determination of Level I and Level II concentrations.

In general, sites containing mixed radioactive and other hazardous substances involve more evaluation than sites containing only radionuclides. For sites containing mixed radioactive and other hazardous substances, HRS factors are evaluated based on considerations of both the radioactive substances and the other hazardous substances in order to derive a single set of factor values for each factor category in each of the four pathways. Thus, the HRS score for these sites reflects the combined potential hazards posed by both the radioactive and other hazardous substances.

Section 7 is organized by factor category, similar to sections 3 through 6. Pathway-specific differences in evaluation criteria are specified under each factor category, as appropriate. These differences apply largely to the soil exposure pathway and to sites containing mixed radioactive and other hazardous substances. All evaluation criteria specified in sections 2 through 6 must be met, except where modified in section 7.

7.1 *Likelihood of release/likelihood of exposure.* Evaluate likelihood of release for the three migration pathways and likelihood of exposure for the soil exposure pathway as specified in sections 2 through 6, except: establish an observed release and observed contamination as specified in section 7.1.1. When an observed release cannot be established for a migration pathway, evaluate potential to release as specified in section 7.1.2. When observed contamination cannot be established, do not evaluate the soil exposure pathway.

7.1.1 *Observed release/observed contamination.* For radioactive substances, establish an observed release for each migration pathway by demonstrating that the site has released a radioactive substance to the pathway (or watershed or aquifer, as appropriate); establish observed contamination for the soil exposure pathway as indicated below. Base these demonstrations on one or more of the following, as appropriate to the pathway being evaluated:

- Direct observation:
  - For each migration pathway, a material that contains one or more radionuclides has been seen entering the atmosphere, surface water, or ground water, as appropriate, or is known to have entered ground water or surface water through direct deposition, or
  - For the surface water migration pathway, a source area containing radioactive substances has been flooded at a time that radioactive substances were present and one or more radioactive substances were in contact with the flood waters.
- Analysis of radionuclide concentrations in samples appropriate to the pathway (that is, ground water, soil, air, surface water, benthic, or sediment samples):
  - For radionuclides that occur naturally and for radionuclides that are ubiquitous in the environment:
    - Measured concentration (in units of activity, for example, pCi per kilogram [pCi/kg], pCi per liter [pCi/1], pCi per cubic meter [pCi/m³]) of a given radionuclide in the sample are at a level that:
      - Equals or exceeds a value 2 standard deviations above the mean site-specific background concentration for that

radionuclide in that type of sample, or

---Exceeds the upper-limit value of the range of regional background concentration values for that specific radionuclide in that type of sample.

--Some portion of the increase must be attributable to the site to establish the observed release (or observed contamination), and

--For the soil exposure pathway only, the radionuclide must also be present at the surface or covered by 2 feet or less of cover material (for example, soil) to establish observed contamination.

—For man-made radionuclides without ubiquitous background concentrations in the environment:

--Measured concentration (in units of activity) of a given radionuclide in a sample equals or exceeds the sample quantitation limit for that specific radionuclide in that type of media and is attributable to the site.

--However, if the radionuclide concentration equals or exceeds its sample quantitation limit, but its release can also be attributed to one or more neighboring sites, then the measured concentration of that radionuclide must also equal or exceed a value either 2 standard deviations above the mean concentration of that radionuclide contributed by those neighboring sites or 3 times its background concentration, whichever is lower.

--If the sample quantitation limit cannot be established:

---If the sample analysis was performed under the EPA Contract Laboratory Program, use the EPA contract-required quantitation limit (CRQL) in place of the sample quantitation limit in establishing an observed release (or observed contamination).

---If the sample analysis is not performed under the EPA Contract Labatory Program, use the detection limit in place of the sample quantitation limit.

--For the soil exposure pathway only, the radionuclide must also be present at the surface or covered by 2 feet or less of cover material (for example, soil) to establish observed contamination.

• Gamma radiation measurements (applies only to observed contamination for the soil exposure pathway):

—The gamma radiation exposure rate, as measured in microroentgens per hour (μR/hr) using a survey instrument held 1 meter above the ground surface (or 1 meter away from an aboveground source), equals or exceeds 2 times the site-specific background gamma radiation exposure rate.

—Some portion of the increase must be attributable to the site to establish observed contamination. The gamma-emitting radionuclides do not have to be within 2 feet of the surface of the source.

For the three migration pathways, if an observed release can be established for the pathway (or aquifer or watershed, as appropriate), assign the pathway (or aquifer or watershed) an observed release factor value of 550 and proceed to section 7.2. If an observed release cannot be established, assign an observed release factor value of 0 and proceed to section 7.1.2.

For the soil exposure pathway, if observed contamination can be established, assign the likelihood of exposure factor for resident population a value of 550 if there is an area of observed contamination in one or more locations listed in section 5.1; evaluate the likelihood of exposure factor for nearby population as specified in section 5.2.1; and proceed to section 7.2. If observed contamination cannot be established, do not evaluate the soil exposure pathway.

At sites containing mixed radioactive and other hazardous substances, evaluate observed release (or observed contamination) separately for radionuclides as described in this section and for other hazardous substances as described in sections 2 through 6.

For the three migration pathways, if an observed release can be established based on either radionuclides or other hazardous substances, or both, assign the pathway (or aquifer or watershed) an observed release factor value of 550 and proceed to section 7.2. If an observed release cannot be established based on either radionuclides or other hazardous substances, assign an observed release factor value of 0 and proceed to section 7.1.2.

For the soil exposure pathway, if observed contamination can be established based on either radionuclides or other hazardous substances, or both, assign the likelihood of exposure factor for resident population a value of 550 if there is an area of observed contamination in one or more locations listed in section 5.1; evaluate the likelihood of exposure factor for nearby population as specified in section 5.2.1; and proceed to section 7.2. If observed contamination cannot be established based on either radionuclides or other hazardous substances, do not evaluate the soil exposure pathway.

7.1.2 *Potential to release.* For the three migration pathways, evaluate potential to release for sites containing radionuclides in the same manner as specified for sites containing other hazardous substances. Base the evaluation on the physical and chemical properties of the radionuclides, not on their level of radioactivity.

For sites containing mixed radioactive and other hazardous substances, evaluate potential to release considering radionuclides and other hazardous substances together. Evaluate potential to release for each migration pathway as specified in sections 3, 4, or 6, as appropriate.

7.2 *Waste characteristics.* For radioactive substances, evaluate the human toxicity factor, the ecosystem toxicity factor, the surface water persistence factor, and the hazardous waste quantity factor as specified in the following sections. Evaluate all other waste characteristic factors as specified in sections 2 through 6.

7.2.1 Human toxicity. For radioactive substances, evaluate the human toxicity factor as specified below, not as specified in section 2.4.1.1.

Assign human toxicity factor values to those radionuclides available to the pathway based on quantitative dose-response parameters for cancer risks as follows:

• Evaluate radionuclides only on the basis of carcinogenicity and assign all radionuclides to weight-of-evidence category A.

• Assign a human toxicity factor value from Table 7-2 to each radionuclide based on its slope factor (also referred to as cancer potency factor).

—For each radionuclide, use the higher of the slope factors for inhalation and ingestion to assign the factor value.

—If only one slope factor is available for the radionuclide, use it to assign the toxicity factor value.

—If no slope factor is available for the radionuclide, assign that radionuclide a toxicity factor value of 0 and use other radionuclides for which a slope factor is available to evaluate the pathway.

• If all radionuclides available to a particular pathway are assigned a human toxicity factor value of 0 (that is, no slope factor is available for all the radionuclides), use a default human toxicity factor value of 1,000 as the human toxicity factor value for all radionuclides available to the pathway.

At sites containing mixed radioactive and other hazardous substances, evaluate the toxicity factor separately for the radioactive and other hazardous substances and assign each a separate toxicity factor value. This applies regardless of whether the radioactive and other hazardous substances are physically separated, combined chemically, or simply mixed together. Assign toxicity factor values to the radionuclides as specified above and to the other hazardous substances as specified in section 2.4.1.1.

At sites containing mixed radioactive and other hazardous substances, if all radionuclides available to a particular pathway are assigned a human toxicity factor value of 0, use a default human toxicity factor value of 1,000 for all those radionuclides even if nonradioactive hazardous substances available to the pathway are assigned human toxicity factor values greater than 0. Similarly, if all nonradioactive hazardous substances available to the pathway are assigned a human toxicity factor value of 0, use a default human toxicity factor value of 100 for all these nonradioactive hazardous substances even if radionuclides available to the pathway are assigned human toxicity factor values greater than 0.

7.2.2 *Ecosystem toxicity.* For the surface water environmental threat (see sections 4.1.4 and 4.2.4), assign an ecosystem toxicity factor value to radionuclides (alone or combined chemically or mixed with other hazardous substances) using the same slope factors and procedures specified for the human toxicity factor in section 7.2.1, except: use a default of 100, not 1,000, if all radionuclides eligible to be evaluated for ecosystem toxicity receive an ecosystem toxicity factor value of 0.

TABLE 7-2.—TOXICITY FACTOR VALUES FOR RADIONUCLIDES

Cancer slope factor[a] (SF) $(pCi)^{-1}$	Assigned value
$3\times10^{-11} \leq SF$	10,000
$3\times10^{-12} \leq SF < 3\times10^{-11}$	1,000
$SF < 3\times10^{-12}$	100
SF not available for the radionuclide	0

[a] Radionuclide slope factors are estimates of age-averaged, individual lifetime total excess cancer risk per picocurie of radionuclide inhaled or ingested.

At sites containing mixed radioactive and other hazardous substances, evaluate the ecosystem toxicity factor separately for the radioactive and other hazardous substances and assign each a separate ecosystem toxicity factor value. This applies regardless of whether the radioactive and other hazardous substances are physically separated, combined chemically, or simply mixed together. Assign ecosystem toxicity factor values to the radionuclides as specified above and to the other hazardous substances as specified in sections 4.1.4.2.1.1 and 4.2.4.2.1.1. If all radionuclides available to a particular pathway are assigned an ecosystem toxicity factor value of 0, use a default ecosystem toxicity factor value of 100 for all these radionuclides even if nonradioactive hazardous substances available to the pathway are assigned ecosystem toxicity factor values greater than 0. Similarly, if all nonradioactive hazardous substances available to the pathway are assigned an ecosystem toxicity factor value of 0, use a default ecosystem toxicity factor value of 100 for all these nonradioactive hazardous substances even if radionuclides available to the pathway are assigned ecosystem toxicity factor values greater than 0.

7.2.3 *Persistence*. For radionuclides, evaluate the surface water persistence factor based solely on half-life; do not include sorption to sediments in the evaluation as is done for nonradioactive hazardous substances. Assign a persistence factor value from Table 4-10 (section 4.1.2.2.1.2) to each radionuclide based on half-life ($t_{1/2}$) calculated as follows:

$$t_{1/2}=\frac{1}{\frac{1}{r}+\frac{1}{v}}$$

where:

r=Radioactive half-life.
v=Volatilization half-life.

If the volatilization half-life cannot be estimated for a radionuclide from available data, delete it from the equation. Select the portion of Table 4-10 to use in assigning the persistence factor value as specified in section 4.1.2.2.1.2.

At sites containing mixed radioactive and other hazardous substances, evaluate the persistence factor separately for each radionuclide and for each nonradioactive hazardous substance, even if the available data indicate that they are combined chemically. Assign a persistence factor value to each radionuclide as specified in this section and to each nonradioactive hazardous substance as specified in section 4.1.2.2.1.2. When combined chemically, assign a single persistence factor value based on the higher of the two values assigned (individually) to the radioactive and nonradioactive components.

7.2.4 *Selection of substance potentially posing greatest hazard*. For each migration pathway (threat, aquifer, or watershed, as appropriate), select the radioactive substance or nonradioactive hazardous substance that potentially poses the greatest hazard based on its toxicity factor value, combined with the applicable mobility, persistence, and/or bioaccumulation (or ecosystem bioaccumulation) potential factor values. Combine these factor values as specified in sections 2, 3, 4, and 6. For the soil exposure pathway, base the selection on the toxicity factor alone (see sections 2 and 5).

7.2.5 *Hazardous waste quantity*. To calculate the hazardous waste quantity factor value for sites containing radioactive substances, evaluate source hazardous waste quantity (see section 2.4.2.1) using only the following two measures in the following hierarchy (these measures are consistent with Tiers A and B for nonradioactive hazardous substances in sections 2.4.2.1.1 and 2.4.2.1.2):

- Radionuclide constituent quantity (Tier A).
- Radionuclide wastestream quantity (Tier B).

7.2.5.1 *Source hazardous waste quantity for radionuclides*. For each migration pathway, assign a source hazardous waste quantity value to each source having a containment factor value greater than 0 for the pathway being evaluated. For the soil exposure pathway, assign a source hazardous waste quantity value to each area of observed contamination, as applicable to the threat being evaluated. Allocate hazardous substances and hazardous wastestreams to specific sources (or areas of observed contamination) as specified in section 2.4.2.

7.2.5.1.1 *Radionuclide constituent quantity (Tier A)*. Evaluate radionuclide constituent quantity for each source (or area of observed contamination) based on the activity content of the radionuclides allocated to the source (or area of observed contamination) as follows:

- Estimate the net activity content (in curies) for the source (or area of observed contamination) based on:
  - Manifests, or
  - Either of the following equations, as applicable:

$$N=9.1\times10^{-7}(V)\sum_{i=1}^{n} AC_i$$

where:

N=Estimated net activity content (in curies) for the source (or area of observed contamination).
V=Total volume of material (in cubic yards) in a source (or area of observed contamination) containing radionuclides.
AC_i=Activity concentration above the respective background concentration (in pCi/g) for each radionuclide i allocated to the source (or area of observed contamination).
n=Number of radionuclides allocated to the source (or area of observed contamination) above the respective background concentrations.

or,

$$N=3.8\times10^{-12}(V)\sum_{i=1}^{n} AC_i$$

where:

N=Estimated net activity content (in curies) for the source (or area of observed contamination).
V=Total volume of material (in gallons) in a source (or area of observed contamination) containing radionuclides.
AC_i=Activity concentration above the respective background concentration (in pCi/1) for each radionuclide i allocated to the source (or area of observed contamination).
n=Number of radionuclides allocated to the source (or area of observed contamination) above the respective background concentrations.

- Estimate volume for the source (or volume for the area of observed contamination) based on records or measurements.
- For the soil exposure pathway, in estimating the volume for areas of observed contamination, do not include more than the first 2 feet of depth, except: for those types of areas of observed contamination listed in Tier C of Table 5-2 (section 5.1.2.2), include the entire depth, not just that within 2 feet of the surface.

- Convert from curies of radionuclides to equivalent pounds of nonradioactive hazardous substances by multiplying the activity estimate for the source (or area of observed contamination) by 1,000.
- Assign this resulting product as the radionuclide constituent quantity value for the source (or area of observed contamination).

If the radionuclide constituent quantity for the source (or area of observed contamination) is adequately determined (that is, the total activity of all radionuclides in the source and releases from the source [or in the area of observed contamination] is known or is estimated with reasonable confidence), do not evaluate the radionuclide wastestream quantity measure in section 7.2.5.1.2. Instead, assign radionuclide wastestream quantity a value of 0 and proceed to section 7.2.5.1.3. If the radionuclide constituent quantity is not adequately determined, assign the source (or area of observed contamination) a value for radionuclide constituent quantity based on the available data and proceed to section 7.2.5.1.2.

7.2.5.1.2 *Radionuclide wastestream quantity (Tier B).* Evaluate radionuclide wastestream quantity for the source (or area of observed contamination) based on the activity content of radionuclide wastestreams allocated to the source (or area of observed contamination) as follows:

• Estimate the total volume (in cubic yards or in gallons) of wastestreams containing radionuclides allocated to the source (or area of observed contamination).

• Divide the volume in cubic yards by 0.55 (or the volume in gallons by 110) to convert to the activity content expressed in terms of equivalent pounds of nonradioactive hazardous substances.

• Assign the resulting value as the radionuclide wastestream quantity value for the source (or area of observed contamination).

7.2.5.1.3 *Calculation of source hazardous waste quantity value for radionuclides.* Select the higher of the values assigned to the source (or area of observed contamination) for radionuclide constituent quantity and radionuclide wastestream quantity. Assign this value as the source hazardous waste quantity value for the source (or area of observed contamination). Do not round to th nearest integer.

7.2.5.2 *Calculation of hazardous waste quantity factor value for radionuclides.* Sum the source hazardous waste quantity values assigned to all sources (or areas of observed contamination) for the pathway being evaluated and round this sum to the nearest integer, except: if the sum is greater than 0, but less than 1, round it to 1. Based on this value, select a hazardous waste quantity factor value for this pathway from Table 2-6 (section 2.4.2.2).

For a migration pathway, if the radionuclide constituent quantity is adequately determined (see section 7.2.5.1.1) for all sources (or all portions of sources and releases remaining after a removal action), assign the value from Table 2-6 as the hazardous waste quantity factor value for the pathway. If the radionuclide constituent quantity is not adequately determined for one or more sources (or one or more portions of sources or releases remaining after a removal action), assign a factor value as follows:

• If any target for that migration pathway is subject to Level I or Level II concentration (see section 7.3), assign either the value from Table 2-6 or a value of 100, whichever is greater, as the hazardous waste quantity factor value for that pathway.

• If none of the targets for that pathway is subject to Level I or Level II concentrations, assign a factor value as follows:

–If there has been no removal action, assign either the value from Table 2-6 or a value of 10, whichever is greater, as the hazardous waste quantity factor value for that pathway.

–If there has been a removal action:

– –Determine values from Table 2-6 with and without consideration of the removal action.

– –If the value that would be assigned from Table 2-6 without consideration of the removal action would be 100 or greater, assign either the value from Table 2-6 with consideration of the removal action or a value of 100, whichever is greater, as the hazardous waste quantity factor value for the pathway.

– –If the value that would be assigned from Table 2-6 without consideration of the removal action would be less than 100, assign a value of 10 as the hazardous waste quantity factor value for the pathway.

For the soil exposure pathway, if the radionuclide constituent quantity is adequately determined for all areas of observed contamination, assign the value from Table 2-6 as the hazardous waste quantity factor value. If the radionuclide constituent quantity is not adequately determined for one or more areas of observed contamination, assign either the value from Table 2-6 or a value of 10, whichever is greater, as the hazardous waste quantity factor value.

7.2.5.3 *Calculation of hazardous waste quantity factor value for sites containing mixed radioactive and other hazardous substances.* For each source (or area of observed contamination) containing mixed radioactive and other hazardous substances, calculate two source hazardous waste quantity values—one based on radionuclides as specified in sections 7.2.5.1 through 7.2.5.1.3 and the other based on the nonradioactive hazardous substances as specified in sections 2.4.2.1 through 2.4.2.1.5 (that is, determine each value as if the other type of substance was not present). Sum the two values to determine a combined source hazardous waste quantity value for the source (or area of observed contamination). Do not round this value to the nearest integer.

Use this combined source hazardous waste quantity value to calculate the hazardous waste quantity factor value for the pathway as specified in section 2.4.2.2, except: if either the hazardous constituent quantity or the radionuclide constituent quantity, or both, are not adequately determined for one or more sources (or one or more portions of sources or releases remaining after a removal action) or for one or more areas of observed contamination, as applicable, assign the value from Table 2-6 or the default value applicable for the pathway, whichever is greater, as the hazardous waste quantity factor value for the pathway.

7.3 *Targets.* For radioactive substances, evaluate the targets factor category as specified in section 2.5 and sections 3 through 6, except: establish Level I and Level II concentrations at sampling locations as specified in sections 7.3.1 and 7.3.2.

For all pathways (and threats), use the same target distance limits for sites containing radioactive substances as is specified in sections 3 through 6 for sites containing nonradioactive hazardous substances. At sites containing mixed radioactive and other hazardous substances, include all sources (or areas of observed contamination) at the site in identifying the applicable targets for the pathway.

7.3.1 *Level of contamination at a sampling location.* Determine whether Level I or Level II concentrations apply at a sampling location (and thus to the associated targets) as follows:

• Select the benchmarks from section 7.3.2 applicable to the pathway (or threat) being evaluated.

• Compare the concentrations of radionuclides in the sample (or comparable samples) to their benchmark concentrations for the pathway (or threat) as specified in section 7.3.2. Treat comparable samples as specified in section 2.5.1.

• Determine which level applies based on this comparison.

• If none of the radionuclides eligible to be evaluated for the sampling location have an applicable benchmark, assign Level II to the actual contamination at that sampling location for the pathway (or threat).

• In making the comparison, consider only those samples, and only those radionuclides in the sample, that meet the criteria for an observed release (or observed contamination) for the pathway, except: tissue samples from aquatic human food chain organisms may also be used for the human food chain threat of the surface water pathway as specified in sections 4.1.3.3 and 4.2.3.3.

7.3.2 *Comparison to benchmarks.* Use the following media specific benchmarks (expressed in activity units, for example, pCi/l for water, pCi/kg for soil and for aquatic human food chain organisms, and pCi/m^3 for air) for making the comparisons for the indicated pathway (or threat):

• Maximum Contaminant Levels (MCLs)—ground water migration pathway and drinking water threat in surface water migration pathway.

• Uranium Mill Tailings Radiation Control Act (UMTRCA) standards—soil exposure pathway only.

• Screening concentration for cancer corresponding to that concentration that corresponds to the 10^{-6} individual cancer risk for inhalation exposures (air migration pathway) or for oral exposures (ground water migration pathway; drinking water or human food chain threats in surface water migration pathway; and soil exposure pathway).

–For the soil exposure pathway, include two screening concentrations for cancer—one for ingestion of surface materials and one for external radiation exposures from gamma-emitting radionuclides in surface materials.

Select the benchmark(s) applicable to the pathway (or threat) being evaluated. Compare the concentration of each radionuclide from the sampling location to its benchmark concentration(s) for that pathway (or threat). Use only those samples and only those radionuclides in the sample that meet the criteria for an observed release (or observed contamination) for the pathway, except: tissue samples from aquatic human food chain organisms may be used as specified in sections 4.1.3.3 and 4.2.3.3. If the concentration of any applicable radionuclide from any sample equals or exceeds its benchmark concentration, consider the sampling location to be subject to Level I concentrations for that pathway (or threat). If more than one benchmark applies to the radionuclide, assign Level I if the radionuclide concentration equals or exceeds the lowest applicable benchmark concentration. In addition, for the soil exposure pathway, assign Level I concentrations at the sampling location if measured gamma radiation exposure rates equal or exceed 2 times the background level (see section 7.1.1).

If no radionuclide individually equals or exceeds its benchmark concentration, but more than one radionuclide either meets the criteria for an observed release (or observed contamination) for the sample or is eligible to be evaluated for a tissue sample (see sections 4.1.3.3 and 4.2.3.3), calculate a value for index I for these radionuclides as specified in section 2.5.2. If I equals or exceeds 1, assign Level I to the sampling location. If I is less than 1, assign Level II.

At sites containing mixed radioactive and other hazardous substances, establish the level of contamination for each sampling location considering radioactive substances and nonradioactive hazardous substances separately. Compare the concentration of each radionuclide and each nonradioactive hazardous substance from the sampling location to its respective benchmark concentration(s). Use only those samples and only those substances in the sample that meet the criteria for an observed release (or observed contamination) for the pathway except: tissue samples from aquatic human food chain organisms may be used as specified in sections 4.1.3.3 and 4.2.3.3. If the concentration of one or more applicable radionuclides or other hazardous substances from any sample equals or exceeds its benchmark concentration, consider the sampling location to be subject to Level I concentrations. If more than one benchmark applies to a radionuclide or other hazardous substance, assign Level I if the concentration of the radionuclide or other hazardous substance equals or exceeds its lowest applicable benchmark concentration.

If no radionuclide or other hazardous substance individually exceed a benchmark concentration, but more than one radionuclide or other hazardous substance either meets the criteria for an observed release (or observed contamination) for the sample or is eligible to be evaluated for a tissue sample, calculate an index I for both types of substances as specified in section 2.5.2. Sum the index I values for the two types of substances. If the value, individually or combined, equals or exceeds 1, assign Level I to the sample location. If it is less than 1, calculate an index J for the nonradioactive hazardous substances as specified in section 2.5.2. If J equals or exceeds 1, assign Level I to the sampling location. If J is less than 1, assign Level II.

[FR Doc. 90-27195 Filed 12-13-90;8:45 am]
BILLING CODE 6560-50-M

REFERENCE 2

SUPERFUND CHEMICAL DATA MATRIX METHODOLOGY

Prepared For EPA
January 2004

1

TABLE OF CONTENTS

List of Figures

List of Tables

HAZARD RANKING SYSTEM
Hazardous Substance Factor Values

			Ground Water Mobility				Persistence		Bioaccumulation				Ecotoxicity					
			Liquid		Non-Liquid				Food Chain		Environment							
Substance Name	CAS Number	Toxicity	Karst	Non-Karst	Karst	Non-Karst	River	Lake	Fresh	Salt	Fresh	Salt	Fresh	Salt	Air Gas Migration	Air Gas Mobility	Gas	Part
Acenaphthene	000083-32-9	10	1.00E+00	1.00E-04*	2.00E-01	2.00E-05*	0.4000	0.4000	500.0	500.0	500.0	500.0	10000	1000*	11	0.2000	Yes	Yes
Acenaphthylene	000208-96-8	0	1.00E+00	1.00E-04*	2.00E-01	2.00E-05*	0.4000	1.0000	500.0	500.0	500.0	500.0	0	0	11	0.0200	Yes	Yes
Acetone	000067-64-1	1*	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.0700*	0.0700	0.5	0.5	0.5	0.5	100	1	17	1.0000	Yes	No
Acrolein	000107-02-8	10000	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.0700	0.0700	500.0	500.0	500.0	500.0	10000	1000	17	1.0000	Yes	No
Acrylamide	000079-06-1	10000	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.0000	1.0000	5.0	5.0	5.0	5.0	10	10	6	0.2000	Yes	Yes
Alachlor**	015972-60-8	100	1.00E+00	1.00E-02	1.00E+00	1.00E-02	0.4000	0.0700	500.0	500.0	50.0	50.0	1000	1000	6	0.0200	Yes	Yes
Aldrin	000309-00-2	10000	1.00E+00	1.00E-04	2.00E-03	2.00E-07	1.0000	1.0000	5000.0*	50000.0	50000.0	50000.0	10000	10000	6	0.0020	Yes	Yes
Aluminum	007429-90-5	0	1.00E+00	1.00E+00*	1.00E+00*	1.00E+00*	1.0000	1.0000	50.0	50.0	5000.0*	5000.0*	100	100	...	...	No	Yes
Americium**	007440-35-9	0	1.00E+00	1.00E+00	...	...	1.0000	1.0000	5000.0	5000.0	5000.0	5000.0	0	0	...	...	No	Yes
Aniline	000062-53-3	10000	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.0000	0.4000	50.0*	50.0*	500.0	500.0	10000	10	11	1.0000	Yes	No
Anthracene	000120-12-7	10	1.00E+00	1.00E-04*	2.00E-03	2.00E-07*	0.4000*	0.4000*	50000.0*	50000.0*	50000.0*	50000.0*	10000	10000*	6	0.0020	Yes	Yes
Antimony	007440-36-0	10000	1.00E+00	1.00E-02	1.00E+00	1.00E-02	1.0000	1.0000	5.0*	5.0*	5.0	50.0*	100	100	...	...	No	Yes
Arsenic	007440-38-2	10000	1.00E+00	1.00E-02	1.00E+00	1.00E-02	1.0000	1.0000	5.0	500.0	5000.0*	500.0	10	100	...	...	No	Yes
Asbestos	001332-21-4	10000	1.00E+00	1.00E-04	...	...	1.0000	1.0000	0.5	0.5	0.5	0.5	0	0	...	...	No	Yes
Barium	007440-39-3	10000	1.00E+00	1.00E-02	1.00E+00	1.00E-02	1.0000	1.0000	500.0*	500.0*	500.0*	500.0*	1	1	...	...	No	Yes

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

HAZARD RANKING SYSTEM
Hazardous Substance Factor Values

			Ground Water Mobility				Persistence		Bioaccumulation				Ecotoxicity					
			Liquid		Non-Liquid				Food Chain		Environment							
Substance Name	CAS Number	Toxicity	Karst	Non-Karst	Karst	Non-Karst	River	Lake	Fresh	Salt	Fresh	Salt	Fresh	Salt	Air Gas Migration	Air Gas Mobility	Gas	Part
Benz(a)anthracene	000056-55-3	1000	1.00E+00	1.00E-04*	2.00E-05	2.00E-09*	1.0000	1.0000	50000.0	50000.0	50000.0	50000.0	10000	10000	6	0.0020	Yes	Yes
Benzene	000071-43-2	1000*	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000	0.4000	5000.0	5000.0	5000.0*	50000.0	1000*	1000	17	1.0000	Yes	No
Benzidine	000092-87-5	10000	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.0000	0.4000	50.0	50.0	5000.0*	5000.0*	100*	100*	0	0.0002	Yes	Yes
Benzo(a)pyrene	000050-32-8	10000	1.00E+00	1.00E-04	2.00E-05	2.00E-09	1.0000	1.0000	50000.0	50000.0*	50000.0	50000.0*	10000	1000	6	0.0002	Yes	Yes
Benzo(g,h,i)perylene	000191-24-2	0	1.00E+00	1.00E-04	2.00E-05	2.00E-09	1.0000	1.0000	50000.0	50000.0	50000.0	50000.0	0	0	...	...	No	Yes
Benzo(j,k)fluorene (Fluoranthene)	000206-44-0	100	1.00E+00	1.00E-04*	2.00E-03	2.00E-07*	1.0000	1.0000	500.0*	5000.0	5000.0*	5000.0	10000	10000*	6	0.0020	Yes	Yes
6 Benzo(k)fluoranthene	000207-08-9	100	1.00E+00	1.00E-04	2.00E-05	2.00E-09	1.0000	1.0000	50000.0	50000.0	50000.0	50000.0	0	0	6	0.0002	Yes	Yes
Beryllium	007440-41-7	10000	1.00E+00	1.00E-02	1.00E+00	1.00E-02	1.0000	1.0000	50.0	50.0	50.0	50.0	0	0	...	...	No	Yes
Bis (2-ethylhexyl) phthalate	000117-81-7	100	1.00E+00	1.00E-04	2.00E-03	2.00E-07	1.0000	1.0000	50000.0	500.0*	50000.0	5000.0*	1000	1000*	6	0.0002*	Yes	Yes
Boron	007440-42-8	100	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.0000	1.0000	0.5	0.5	0.5	0.5	0	0	...	...	No	Yes
Bromodichloromethane	000075-27-4	100	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000	1.0000	50.0	50.0	50.0	50.0	0	0	17	1.0000	Yes	No
Butylbenzyl phthalate	000085-68-7	10	1.00E+00	1.00E-04*	2.00E-01	2.00E-05*	1.0000	1.0000	500.0	500.0	500.0	500.0	1000*	1000*	6	0.0020	Yes	Yes
Cadmium	007440-43-9	10000	1.00E+00	1.00E-02	1.00E+00*	1.00E-02*	1.0000	1.0000	5000.0	50000.0*	50000.0*	50000.0*	10000*	1000	...	...	No	Yes
Carbazole	000086-74-8	10	1.00E+00	1.00E-02*	2.00E-01	2.00E-03*	0.4000	0.0700	500.0	500.0	500.0	500.0	1000*	1000*	6*	0.0200*	Yes	Yes

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

HAZARD RANKING SYSTEM

Hazardous Substance Factor Values

			Ground Water Mobility				Persistence		Bioaccumulation				Ecotoxicity					
			Liquid		Non-Liquid				Food Chain		Environment							
Substance Name	CAS Number	Toxicity	Karst	Non-Karst	Karst	Non-Karst	River	Lake	Fresh	Salt	Fresh	Salt	Fresh	Salt	Air Gas Migration	Air Gas Mobility	Gas	Part
Carbon disulfide	000075-15-0	10	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000	0.4000	500.0	500.0	500.0	500.0	100	10*	17	1.0000	Yes	No
Carbon tetrachloride	000056-23-5	1000	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000	1.0000	50.0	50.0	500.0*	500.0*	100	10*	17	1.0000	Yes	No
Cesium	007440-46-2	0	1.00E+00	1.00E-02	1.00E+00	1.00E-02	1.0000	1.0000	5.0*	50.0*	5.0*	50.0*	0	0	...	...	No	Yes
Chlordane	000057-74-9	10000	1.00E+00	1.00E-02	2.00E-03	2.00E-05	1.0000	1.0000	5000.0*	5000.0*	50000.0	5000.0*	10000	10000	6	0.0020	Yes	Yes
Chlordane, alpha-	005103-71-9	10000*	1.00E+00	1.00E-02	2.00E-03	2.00E-05	1.0000	1.0000	50000.0*	50000.0*	50000.0*	50000.0*	10000	10000	11*	0.0200*	Yes*	Yes
Chlordane, gama-	005566-34-7	10000*	1.00E+00	1.00E-02	2.00E-03	2.00E-05	1.0000	1.0000	50000.0	50000.0	50000.0*	50000.0*	0*	0*	6*	0.0020*	Yes*	Yes
Chlorobenzene	000108-90-7	100	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.0007	0.0700	50.0	50.0	5000.0*	5000.0*	10000*	100	17	1.0000	Yes	No
Chloroform	000067-66-3	100	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000	1.0000	5.0	5.0	500.0*	500.0*	100*	10	17	1.0000	Yes	No
Chromium	007440-47-3	10000	1.00E+00	1.00E-02	1.00E+00	1.00E-02	1.0000	1.0000	500.0*	500.0	500.0*	500.0	10000*	100	...	...	No	Yes
Chromium(III)	016065-83-1	1	1.00E+00	1.00E-04	1.00E+00	1.00E-04	1.0000	1.0000	500.0	500.0	500.0	500.0	100*	100*	...	...	No	Yes
Chromium(VI)	018540-29-9	10000	1.00E+00	1.00E-02	1.00E+00	1.00E-02	1.0000	1.0000	5.0	500.0	5.0	500.0	100	100	...	...	No	Yes
Chrysene	000218-01-9	10	1.00E+00	1.00E-04*	2.00E-05	2.00E-09*	1.0000	1.0000	5.0*	5.0*	5000.0	500.0	1000	1000	6	0.0002	Yes	Yes
Cobalt	007440-48-4	10*	1.00E+00	1.00E-02	1.00E+00	1.00E-02	1.0000	1.0000	5000.0*	5000.0*	5000.0	5000.0	0	0	...	...	No	Yes
Copper	007440-50-8	0	1.00E+00	1.00E-02	1.00E+00	1.00E-02	1.0000	1.0000	500.0*	50000.0	5000.0*	50000.0	1000*	1000*	...	...	No	Yes
Cumene	000098-82-8	10*	1.00E+00	1.00E-02*	2.00E-01	2.00E-03*	0.4000	0.4000	500.0	500.0	500.0	500.0	100	1	17	1.0000	Yes	No

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

2

HAZARD RANKING SYSTEM
Hazardous Substance Factor Values

Substance Name	CAS Number	Toxicity	Ground Water Mobility: Liquid: Karst	Ground Water Mobility: Liquid: Non-Karst	Ground Water Mobility: Non-Liquid: Karst	Ground Water Mobility: Non-Liquid: Non-Karst	Persistence: River	Persistence: Lake	Bioaccumulation: Food Chain: Fresh	Bioaccumulation: Food Chain: Salt	Bioaccumulation: Environment: Fresh	Bioaccumulation: Environment: Salt	Ecotoxicity: Fresh	Ecotoxicity: Salt	Air Gas Migration	Air Gas Mobility	Gas	Part
Cyanamide**	000420-04-2	10	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.0000	1.0000	0.5	0.5	0.5	0.5	10	100	6	0.2000	Yes	Yes
Cyanide	000057-12-5	100	1.00E+00	1.00E+00	1.00E+00*	1.00E+00*	1.0000*	1.0000*	0.5	0.5	0.5	0.5	1000	1000	17*	1.0000*	Yes*	No*
DDD	000072-54-8	100	1.00E+00	1.00E-04	2.00E-03	2.00E-07	1.0000	1.0000	50000.0	50000.0	50000.0	50.0*	10000	10000	6	0.0020	Yes	Yes
DDE	000072-55-9	100	1.00E+00	1.00E-04	2.00E-03	2.00E-07	1.0000	1.0000	50000.0	50000.0	50000.0	50000.0	10000	10000	6	0.0020	Yes	Yes
DDT	000050-29-3	1000	1.00E+00	1.00E-04	2.00E-03	2.00E-07	1.0000	1.0000	50000.0	50000.0	50000.0	50000.0	10000	10000	6	0.0020	Yes	Yes
Di-n-butyl phthalate	000084-74-2	10	1.00E+00	1.00E-04*	2.00E-01	2.00E-05*	1.0000	1.0000	5000.0	5000.0	5000.0	5000.0	1000	10000	6	0.0200	Yes	Yes
Di-n-octyl phthalate	000117-84-0	100	1.00E+00	1.00E-04	2.00E-03	2.00E-07	1.0000	1.0000	500.0	500.0	50000.0*	50000.0*	0	0	6	0.0020	Yes	Yes
Dibenz(a,h)anthracene	000053-70-3	10000	1.00E+00	1.00E-04	2.00E-05	2.00E-09	1.0000	1.0000	50000.0	50000.0	50000.0	50000.0	0	0	...	...	No	Yes
Dibenzofuran	000132-64-9	1000*	1.00E+00	1.00E-04*	2.00E-01	2.00E-05*	1.0000	1.0000	500.0	500.0	500.0	500.0	1000*	1000*	11	0.0200	Yes	Yes
Dibromo-3-chloropropane, 1,2-	000096-12-8	10000	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.0000	1.0000	50.0	50.0	50.0	50.0	10*	10*	11	1.0000	Yes	No
Dibromoethane, 1,2-	000106-93-4	10000	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000	1.0000	5.0	5.0	5.0	5.0	10*	100*	17	1.0000	Yes	No
Dichlorobenzene, 1,4-	000106-46-7	10	1.00E+00	1.00E+00	2.00E-01	2.00E-01	0.4000	1.0000	5000.0*	5000.0*	5000.0*	5000.0*	1000*	100	17	1.0000	Yes	No
Dichloroethane, 1,1-	000075-34-3	10	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000	1.0000	5.0	5.0	5.0	5.0	0	0	17	1.0000	Yes	No
Dichloroethane, 1,2-	000107-06-2	100	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000	1.0000	5.0	5.0	5.0	5.0	10*	1	17	1.0000	Yes	No

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

HAZARD RANKING SYSTEM
Hazardous Substance Factor Values

			Ground Water Mobility				Persistence		Bioaccumulation				Ecotoxicity					
			Liquid		Non-Liquid				Food Chain		Environment							
Substance Name	CAS Number	Toxicity	Karst	Non-Karst	Karst	Non-Karst	River	Lake	Fresh	Salt	Fresh	Salt	Fresh	Salt	Air Gas Migration	Air Gas Mobility	Gas	Part
Dichloroethylene, 1,1-	000075-35-4	100	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000	1.0000	50.0	50.0	50.0	50.0	100*	1	17	1.0000	Yes	No
Dichloroethylene, 1,2-**	000540-59-0	100	1.00E+00	1.00E-02	1.00E+00	1.00E-02	0.4000	1.0000	50.0	50.0	50.0	50.0	1	1	17	1.0000	Yes	No
Dichloroethylene, cis-1,2-	000156-59-2	100	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000	1.0000	5.0	5.0	5.0	5.0	0	0	17	1.0000	Yes	No
Dichloroethylene, trans-1,2-	000156-60-5	100	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000	1.0000	50.0	50.0	50.0	50.0	1	1	17	1.0000	Yes	No
Dichlorophenol, 2,4-	000120-83-2	1000	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.0007	0.0700	50.0	50.0	500.0	500.0	10000*	100	11	0.2000	Yes	Yes
Dichloropropane, 1,2-	000078-87-5	1000	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000	1.0000	50.0*	50.0*	50.0*	50.0*	10	10*	17	1.0000	Yes	No
Dichloropropene, 1,3-	000542-75-6	100*	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000	0.4000	5.0*	5.0*	5.0*	5.0*	1000	1000*	17	1.0000	Yes	No
Dieldrin	000060-57-1	10000	1.00E+00	1.00E-02	2.00E-03	2.00E-05	1.0000	1.0000	50000.0	5000.0	50000.0	50000.0*	10000	10000	6	0.0020	Yes	Yes
Diethyl phthalate	000084-66-2	1	1.00E+00	1.00E-02*	1.00E+00	1.00E-02*	1.0000	1.0000	500.0	500.0	500.0	500.0	10	100*	11	0.2000	Yes	Yes
Dimethyl phenol, 2,4-	000105-67-9	100	1.00E+00	1.00E-02*	1.00E+00	1.00E-02*	1.0000	0.4000	500.0	500.0	500.0	500.0	100	1000*	11	0.2000	Yes	Yes
Dinitrobenzene, 1,3-	000099-65-0	10000	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.0000	0.4000*	5.0	5.0	5.0	5.0	100	100	6	0.0200	Yes	Yes
Dioxin 1,4-**	000290-67-5	10	1.00E+00	...	...	...	0.4000	0.0700	0.5	0.5	0.5	0.5	0	0	...	...	No	Yes
Diphenylhydrazine, 1,2-	000122-66-7	1000	1.00E+00	1.00E-02*	2.00E-01	2.00E-03*	1.0000	1.0000	50.0	50.0	50.0	50.0	1000	1000	6	0.0200	Yes	Yes
Disulfoton	000298-04-4	10000	1.00E+00	1.00E-04*	2.00E-01	2.00E-05*	1.0000	0.4000	500.0	500.0	5000.0*	5000.0*	10000	10000*	6	0.0200	Yes	Yes

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

			Ground Water Mobility				Persistence		Bioaccumulation				Ecotoxicity					
			Liquid		Non-Liquid				Food Chain		Environment							
Substance Name	CAS Number	Toxicity	Karst	Non-Karst	Karst	Non-Karst	River	Lake	Fresh	Salt	Fresh	Salt	Fresh	Salt	Air Gas Migration	Air Gas Mobility	Gas	Part
Endosulfan (I or II)	000115-29-7	100	1.00E+00	1.00E+00	2.00E-03	2.00E-03	1.0000	0.4000	5.0*	5000.0	50000.0	5000.0	10000	10000	11	0.0020	Yes	Yes
Endosulfan I**	000959-98-8	100	1.00E+00	1.00E+00	2.00E-03	2.00E-03	1.0000	1.0000	500.0	500.0	50000.0	50000.0	10000	10000	11	0.0020	Yes	Yes
Endosulfan II**	033213-65-9	100	1.00E+00	1.00E+00	...	...	1.0000	1.0000	500.0	500.0	5000.0	5000.0	10000	10000	11	0.0020	Yes	Yes
Endrin	000072-20-8	10000	1.00E+00	1.00E-02	2.00E-03	2.00E-05	1.0000	1.0000	5000.0	5000.0	50000.0	5000.0	10000	10000	6	0.0020	Yes	Yes
Endrin aldehyde	007421-93-4	0	1.00E+00	1.00E-04*	2.00E-03*	2.00E-07*	1.0000*	1.0000*	5000.0*	5000.0*	5000.0*	5000.0*	0	0	6*	0.0020*	Yes*	Yes
Ethyl benzene	000100-41-4	10	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.0007*	0.0700*	50.0	50.0	50.0	50.0	100	1000*	17	1.0000	Yes	No
Ethyl chloride	000075-00-3	1	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.0007	0.0700	5.0	5.0	5.0	5.0	0	0	17	1.0000	Yes	No
Ethylene glycol monobutyl ether (EBGE)**	000111-76-2	10	1.00E+00	1.00E+00	...	...	1.0000	1.0000	5.0	5.0	5.0	5.0	1	1	...	...	No	Yes
Fluorene	000086-73-7	100	1.00E+00	1.00E-04*	2.00E-01	2.00E-05*	1.0000	1.0000	500.0*	500.0*	5000.0	5000.0	1000	1000	11	0.0200	Yes	Yes
Fluorine	007782-41-4	10	1.00E+00	1.00E-02	2.00E-01*	2.00E-03*	0.4000	0.0700	50000.0*	50000.0*	50000.0*	50000.0*	0	0	17	1.0000	Yes	No
Heptachlor	000076-44-8	1000	1.00E+00	1.00E-04	2.00E-03	2.00E-07	0.4000*	0.4000*	50000.0*	50000.0*	50000.0	50000.0	10000	10000	11	0.0200	Yes	Yes
Heptachlor epoxide, alpha, beta, gamma	001024-57-3	10000	1.00E+00	1.00E-04*	2.00E-03	2.00E-07*	1.0000	1.0000	5000.0*	5000.0*	50000.0	5000.0*	10000	10000	6	0.0200	Yes	Yes
Heptachlorodibenzo-p-dioxin**	037871-00-4	0	1.00E+00	1.00E-04	2.00E-05	2.00E-09	1.0000	1.0000	50000.0	50000.0	50000.0	50000.0	0	0	...	...	No	Yes
Heptachlorodibenzo-p-dioxin 1,2,3,4,6,7,8-	035822-46-9	10000	1.00E+00	1.00E-04	2.00E-05	2.00E-09	1.0000	1.0000	50000.0	50000.0	50000.0	50000.0	0	0	...	...	No	Yes

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

HAZARD RANKING SYSTEM

Hazardous Substance Factor Values

			Ground Water Mobility				Persistence		Bioaccumulation				Ecotoxicity					
			Liquid		Non-Liquid				Food Chain		Environment							
Substance Name	CAS Number	Toxicity	Karst	Non-Karst	Karst	Non-Karst	River	Lake	Fresh	Salt	Fresh	Salt	Fresh	Salt	Air Gas Migration	Air Gas Mobility	Gas	Part
Heptachlorodibenzofuran 1,2,3,4,6,7,8-	067562-39-4	10000	1.00E+00	1.00E-04	2.00E-05	2.00E-09	1.0000	1.0000	50000.0	50000.0	50000.0	50000.0	0	0	6*	0.0002*	Yes*	Yes
Heptachlorodibenzofuran 1,2,3,4,7,8,9-	055673-89-7	10000*	1.00E+00	...	...	...	0.4000	0.0700	0.5	0.5	0.5	0.5	0	0	...	...	No	Yes
Hexabromobiphenyl (PBB)**	036355-01-8	1	1.00E+00	1.00E-04	2.00E-05	2.00E-09	1.0000	1.0000	50000.0	50000.0	50000.0	50000.0	0	0	6	0.0002	Yes	Yes
Hexachlorobenzene	000118-74-1	1000	1.00E+00	1.00E-02	2.00E-05	2.00E-07	1.0000	1.0000	50000.0*	50000.0	50000.0	50000.0	10000*	10000	11	0.0200	Yes	Yes
Hexachlorobutadiene	000087-68-3	10000	1.00E+00	1.00E-04*	2.00E-01	2.00E-05*	1.0000	1.0000	50.0	50000.0*	5000.0	50000.0*	10000	1000*	17	1.0000	Yes	No
Hexachlorocyclohexane, alpha-	000319-84-6	10000	1.00E+00	1.00E+00	2.00E-01	2.00E-01	1.0000	1.0000	5000.0*	50000.0*	5000.0*	50000.0*	1000*	1000	11	0.0200	Yes	Yes
Hexachlorocyclohexane, beta-	000319-85-7	100	1.00E+00	1.00E+00	2.00E-03	2.00E-03	1.0000	1.0000	500.0	500.0	5000.0*	5000.0	1000*	1000*	6	0.0020	Yes	Yes
Hexachlorodibenzo-p-dioxin 1,2,3,4,7,8-	039227-28-6	10000	1.00E+00	1.00E-04	2.00E-05	2.00E-09	1.0000	1.0000	50000.0	50000.0	50000.0	50000.0	0	0	...	...	No	Yes
Hexachlorodibenzo-p-dioxin 1,2,3,6,7,8-	057653-85-7	10000	1.00E+00	1.00E-04*	...	...	1.0000*	1.0000*	5000.0	5000.0	5000.0	5000.0	0*	0*	...	...	No	Yes
Hexachlorodibenzo-p-dioxin 1,2,3,7,8,9-	019408-74-3	10000	1.00E+00	1.00E-04*	2.00E-05*	2.00E-09*	1.0000*	1.0000*	50000.0*	50000.0*	50000.0*	50000.0*	0	0	...	...	No	Yes
Hexachlorodibenzofuran 1,2,3,4,7,8-	070648-26-9	10000	1.00E+00	1.00E-04	2.00E-05	2.00E-09	1.0000	1.0000	50000.0	50000.0	50000.0	50000.0	0	0	...	...	No	Yes
Hexachlorodibenzofuran 1,2,3,6,7,8-	057117-44-9	10000	1.00E+00	...	...	...	0.4000	0.0700	0.5	0.5	0.5	0.5	0	0	...	...	No	Yes
Hexachlorodibenzofuran 1,2,3,7,8,9-	072918-21-9	10000	1.00E+00	...	...	...	0.4000	0.0700	0.5	0.5	0.5	0.5	0	0	...	...	No	Yes

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

HAZARD RANKING SYSTEM
Hazardous Substance Factor Values

			Ground Water Mobility				Persistence		Bioaccumulation				Ecotoxicity					
			Liquid		Non-Liquid				Food Chain		Environment							
Substance Name	CAS Number	Toxicity	Karst	Non-Karst	Karst	Non-Karst	River	Lake	Fresh	Salt	Fresh	Salt	Fresh	Salt	Air Gas Migration	Air Gas Mobility	Gas	Part
Hexachlorodibenzofuran 2,3,4,6,7,8-	060851-34-5	10000	1.00E+00	...	...	...	0.4000	0.0700	0.5	0.5	0.5	0.5	0	0	...	...	No	Yes
Hydrazine	000302-01-2	10000	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000*	0.0700*	0.5	0.5	0.5	0.5	10000	100	11*	1.0000	Yes	No
Hydrogen sulfide	007783-06-4	1000*	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.0007*	0.0700	0.5	0.5	0.5	0.5	1000	1000	17	1.0000	Yes	No
Indeno(1,2,3-cd)pyrene	000193-39-5	1000	1.00E+00	1.00E-04	2.00E-05	2.00E-09	1.0000	1.0000	50000.0	50000.0	50000.0	50000.0	0	0	...	...	No	Yes
Iron	007439-89-6	1	1.00E+00	1.00E-02	1.00E+00	1.00E-02	1.0000	1.0000	5000.0*	5000.0*	5000.0*	5000.0*	10	10	...	...	No	Yes
Lead	007439-92-1	10000	1.00E+00	1.00E-02	1.00E+00*	1.00E-02*	1.0000	1.0000	5.0*	5000.0	50000.0*	5000.0	1000	1000	...	...	No	Yes
Lead chromate**	007758-97-6	10000	1.00E+00	...	2.00E-03	...	1.0000	1.0000	50000.0	50000.0	50000.0	50000.0	0	0	...	...	No	Yes
Lindane	000058-89-9	10000	1.00E+00	1.00E+00	2.00E-01	2.00E-01	1.0000	1.0000	50000.0*	5000.0*	50000.0*	5000.0*	10000	10000	11	0.0200	Yes	Yes
Manganese	007439-96-5	10000	1.00E+00	1.00E-02	1.00E+00	1.00E-02	1.0000	1.0000	50000.0*	50000.0*	50000.0	50000.0	0	0	...	...	No	Yes
Mercury	007439-97-6	10000	1.00E+00	1.00E-02	1.00E+00*	1.00E-02*	1.0000*	1.0000	50000.0	50000.0	50000.0	50000.0	10000	10000	17	0.2000	Yes	Yes
Methoxychlor	000072-43-5	100	1.00E+00	1.00E-04*	2.00E-03	2.00E-07*	1.0000	1.0000	5.0*	50000.0*	5000.0*	50000.0*	10000	10000	6	0.0020	Yes	Yes
Methyl Parathion	000298-00-0	10000	1.00E+00	1.00E-02*	2.00E-01	2.00E-03*	1.0000	0.4000	50.0	50.0	50.0	50.0	10000	10000	6	0.0200	Yes	Yes
Methyl ethyl ketone	000078-93-3	1*	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000	0.4000	0.5	0.5	0.5	0.5	1	1	17	1.0000	Yes	No
Methyl isobutyl ketone	000108-10-1	10*	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000	0.4000	5.0	5.0	5.0	5.0	1	1	17	1.0000	Yes	No

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

			Ground Water Mobility				Persistence		Bioaccumulation				Ecotoxicity					
			Liquid		Non-Liquid				Food Chain		Environment							
Substance Name	CAS Number	Toxicity	Karst	Non-Karst	Karst	Non-Karst	River	Lake	Fresh	Salt	Fresh	Salt	Fresh	Salt	Air Gas Migration	Air Gas Mobility	Gas	Part
Methyl phenol, 4-	000106-44-5	100	1.00E+00	1.00E-02*	1.00E+00	1.00E-02*	0.0007*	0.0007*	5.0	5.0	5.0	5.0	100*	100*	11	1.0000	Yes	No
Methyl tert-butyl ether (MTBE)**	001634-04-4	1	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000	1.0000	5.0	5.0	5.0	5.0	1	1	17	1.0000	Yes	No
Methylene chloride (dichloromethane)	000075-09-2	10	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000	1.0000	5.0	5.0	500.0*	500.0*	1	10	17	1.0000	Yes	No
Methylnaphthalene, 2-	000091-57-6	0	1.00E+00	1.00E-02	2.00E-01	2.00E-03	0.4000	0.4000	50000.0*	50000.0*	50000.0*	50000.0*	100*	1000	11	0.2000	Yes	Yes
Naphthalene	000091-20-3	1000*	1.00E+00	1.00E-02*	2.00E-01	2.00E-03*	0.4000	0.4000	50000.0*	5000.0*	50000.0*	5000.0	1000	1000	11	0.2000	Yes	Yes
Nickel	007440-02-0	10000	1.00E+00	1.00E-02	1.00E+00*	1.00E-02*	1.0000	1.0000	0.5	500.0	500.0	500.0	100*	1000	...	...	No	Yes
Nitrosodiphenylamine, N-	000086-30-6	10	1.00E+00	1.00E-02*	2.00E-01	2.00E-03*	1.0000	1.0000	500.0	500.0	500.0	500.0	100	100	6	0.0200	Yes	Yes
Pentachlorodibenzo-p-dioxin 1,2,3,7,8-	040321-76-4	10000	1.00E+00	1.00E-04	2.00E-05*	2.00E-09*	1.0000	1.0000	50000.0	50000.0	50000.0	50000.0	0*	0*	...	...	No	Yes
Pentachlorodibenzofuran 1,2,3,7,8-	057117-41-6	0*	1.00E+00	1.00E-04	2.00E-05	2.00E-09	1.0000	1.0000	50000.0	50000.0	50000.0	50000.0	0	0	...	...	No	Yes
Pentachlorodibenzofuran 2,3,4,7,8-**	057117-31-4	10000	1.00E+00	1.00E-04	...	...	1.0000	1.0000	0.5	0.5	0.5	0.5	0	0	6	0.0020	Yes	Yes
Pentachlorophenol (PCP)	000087-86-5	100	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.0000	1.0000	50000.0*	5000.0*	50000.0*	5000.0*	100	1000	6	0.0200	Yes	Yes
Perchlorate**	014797-73-0	10000	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000	0.0700	0.5	0.5	0.5	0.5	0	0	...	...	No	Yes
Phenanthrene	000085-01-8	0	1.00E+00	1.00E-04*	2.00E-01	2.00E-05*	0.4000*	0.4000*	5000.0*	5000.0*	50000.0*	5000.0*	10000*	10000*	11	0.0200	Yes	Yes
Phenol	000108-95-2	10*	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.0007*	0.0700*	50.0*	5.0	50000.0*	5.0	10000	1000*	11	1.0000	Yes	No
Plutonium	007440-07-5	0	1.00E+00	1.00E-04	...	...	1.0000	1.0000	500.0*	500.0*	500.0*	500.0*	0	0	...	...	No	Yes

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

13

HAZARD RANKING SYSTEM

Hazardous Substance Factor Values

			Ground Water Mobility				Persistence		Bioaccumulation				Ecotoxicity					
			Liquid		Non-Liquid				Food Chain		Environment							
Substance Name	CAS Number	Toxicity	Karst	Non-Karst	Karst	Non-Karst	River	Lake	Fresh	Salt	Fresh	Salt	Fresh	Salt	Air Gas Migration	Air Gas Mobility	Gas	Part
Polychlorinated biphenyls (PCBs)	001336-36-3	10000	1.00E+00	1.00E-04	2.00E-03	2.00E-07	1.0000	1.0000	50000.0	50000.0	50000.0	50000.0	10000	10000	11	0.0200	Yes	Yes
Pyrene	000129-00-0	100	1.00E+00	1.00E-04*	2.00E-01*	2.00E-05	1.0000	1.0000	50000.0*	5000.0	50000.0*	5000.0	10000	10000	6	0.0020	Yes	Yes
Radium	007440-14-4	0	1.00E+00	1.00E-02	1.00E+00*	1.00E-02*	1.0000	1.0000	0.5*	0.5*	0.5*	0.5*	0	0	...	...	No	Yes
Radon	010043-92-2	0	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000	0.0700	0.5	0.5	0.5	0.5	0	0	17	1.0000	Yes	No
Selenium	007782-49-2	100	1.00E+00	1.00E+00*	1.00E+00	1.00E+00*	1.0000	1.0000	50.0*	500.0*	500.0*	500.0*	1000	100	...	...	No	Yes
Silver	007440-22-4	100	1.00E+00	1.00E+00	1.00E+00*	1.00E+00*	1.0000	1.0000	50.0	50000.0*	50.0	50000.0*	10000	10000	...	...	No	Yes
Strontium	007440-24-6	1	1.00E+00	1.00E-02	1.00E+00	1.00E-02	1.0000	1.0000	5.0*	5.0*	5.0*	5.0*	0	0	...	...	No	Yes
Styrene	000100-42-5	10	1.00E+00	1.00E-02*	1.00E+00	1.00E-02*	0.4000	1.0000	50.0	50.0	50.0	50.0	100	100	17	1.0000	Yes	No
Tetrachlorobenzene, 1,2,4,5-	000095-94-3	10000	1.00E+00	1.00E-02	2.00E-03	2.00E-05	1.0000	1.0000	5000.0	5000.0	5000.0	5000.0	10000*	1000	17	0.2000	Yes	Yes
Tetrachlorodibenzo-p-dioxin**	041903-57-5	0	1.00E+00	1.00E-04	2.00E-05	2.00E-09	1.0000	1.0000	50000.0	50000.0	50000.0	50000.0	0	0	...	...	No	Yes
Tetrachlorodibenzo-p-dioxin 2,3,7,8- (TCDD)	001746-01-6	10000	1.00E+00	1.00E-04	2.00E-05	2.00E-09	1.0000	1.0000	5000.0	5000.0	5000.0	5000.0	0*	0*	6	0.0002	Yes	Yes
Tetrachlorodibenzofuran 2,3,7,8-	051207-31-9	10000	1.00E+00	1.00E-04	2.00E-05*	2.00E-09*	1.0000	1.0000	50000.0	50000.0	50000.0	50000.0	0	0	6*	0.0020*	Yes*	Yes
Tetrachloroethane, 1,1,2,2-	000079-34-5	10	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000	1.0000	5.0	5.0	5.0	5.0	0*	0*	11	1.0000	Yes	No
Tetrachloroethylene	000127-18-4	100	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000	1.0000	50.0	50.0	50.0	50.0	0*	0*	17	1.0000	Yes	No

(17)

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

HAZARD RANKING SYSTEM
Hazardous Substance Factor Values

			Ground Water Mobility				Persistence		Bioaccumulation				Ecotoxicity					
			Liquid		Non-Liquid				Food Chain		Environment							
Substance Name	CAS Number	Toxicity	Karst	Non-Karst	Karst	Non-Karst	River	Lake	Fresh	Salt	Fresh	Salt	Fresh	Salt	Air Gas Migration	Air Gas Mobility	Gas	Part
Thallium	007440-28-0	100	1.00E+00	1.00E-02*	1.00E+00	1.00E-02*	1.0000	1.0000	500.0	50.0	500.0	50.0	0*	0*	...	...	No	Yes
Toluene	000108-88-3	10	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.0700*	0.0700*	50.0	50.0	5000.0*	50.0	100	100	17	1.0000	Yes	No
Toxaphene	008001-35-2	1000	1.00E+00	1.00E-04*	2.00E-03	2.00E-07*	1.0000	1.0000	50000.0	50000.0	50000.0	50000.0	10000	10000	6	0.0020	Yes	Yes
Trichlorobenzene, 1,2,4-	000120-82-1	100	1.00E+00	1.00E+00	2.00E-01	2.00E-01	0.4000	1.0000	5000.0*	500.0	5000.0*	500.0	1000	10000*	17	1.0000	Yes	No
Trichloroethane, 1,1,1-	000071-55-6	1	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000	1.0000	5.0	5.0	5.0	5.0	10	10	17	1.0000	Yes	No
Trichloroethane, 1,1,2-	000079-00-5	1000	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000	1.0000	50.0	50.0	50.0	50.0	100*	10	17	1.0000	Yes	No
Trichloroethylene (TCE)	000079-01-6	10	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000	1.0000	50.0	50.0	50.0	50.0	100	10	17	1.0000	Yes	No
Trichlorofluoromethane	000075-69-4	10	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000	1.0000	50.0	50.0	50.0	50.0	0	0	17	1.0000	Yes	No
Trichlorophenol, 2,4,6-	000088-06-2	10	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.0000	0.4000	5000.0*	5000.0*	50000.0	50000.0	1000	100	11	0.2000	Yes	Yes
Trichloropropane, 1,2,3-	000096-18-4	10000	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000	1.0000	5.0*	5.0*	5.0*	5.0*	10	10	11	1.0000	Yes	No
Trifluralin (Treflan)	001582-09-8	100	1.00E+00	1.00E-02	2.00E-01	2.00E-03	1.0000	1.0000	5000.0	5000.0	50000.0	50000.0	10000	10000*	11	0.0200	Yes	Yes
Trinitrobenzene, 1,3,5-	000099-35-4	100*	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000	0.0700	5.0	5.0	5.0	5.0	1000	1000	0*	0.0020*	Yes	Yes
Vanadium	007440-62-2	100	1.00E+00	1.00E-02	1.00E+00*	1.00E-02*	1.0000	1.0000	500.0*	500.0*	500.0*	500.0*	0	0	...	...	No	Yes
Vinyl acetate	000108-05-4	10	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.0700*	0.0700*	0.5	0.5	0.5	0.5	10	100*	17	1.0000	Yes	No

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

Substance Name	CAS Number	Toxicity	Ground Water Mobility				Persistence		Bioaccumulation				Ecotoxicity		Air Gas Migration	Air Gas Mobility	Gas	Part
			Liquid		Non-Liquid				Food Chain		Environment							
			Karst	Non-Karst	Karst	Non-Karst	River	Lake	Fresh	Salt	Fresh	Salt	Fresh	Salt				
Vinyl chloride	000075-01-4	10000	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.0007	0.0700	5.0	5.0	5.0	5.0	0	0	17	1.0000	Yes	No
Xylene**	001330-20-7	100	1.00E+00	1.00E-02	1.00E+00	1.00E-02	0.4000	1.0000	50.0	50.0	50.0	50.0	100	100	17	1.0000	Yes	No
Xylene, m-	000108-38-3	1	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.0007*	0.0700*	500.0	500.0	500.0	500.0	100	100*	17	1.0000	Yes	No
Xylene, o-	000095-47-6	1	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000	1.0000	50.0	50.0	50.0	50.0	100	100	17	1.0000	Yes	No
Xylene, p-	000106-42-3	10	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.0007*	0.0700*	50.0	50.0	50.0	50.0	100	100*	17	1.0000	Yes	No
Zinc	007440-66-6	10	1.00E+00	1.00E-02	1.00E+00*	1.00E-02*	1.0000	1.0000	5.0*	50000.0	50000.0*	50000.0	10	100	...	...	No	Yes

16

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

HAZARD RANKING SYSTEM
Hazardous Substance Factor Values

			Ground Water Mobility				Persistence		Bioaccumulation				Ecotoxicity					
			Liquid		Non-Liquid				Food Chain		Environment							
Substance Name	CAS Number	Toxicity	Karst	Non-Karst	Karst	Non-Karst	River	Lake	Fresh	Salt	Fresh	Salt	Fresh	Salt	Air Gas Migration	Air Gas Mobility	Gas	Part
Americium 241	014596-10-2	10000	1.00E+00	1.00E-02	...	...	1.0000	1.0000	0.5	0.5	0.5	0.5	10000	10000	...	...	No	Yes
Antimony 125(+D) (radionuclide)	014234-35-6	1000	1.00E+00	1.00E-02	1.00E+00	1.00E-02	1.0000	1.0000	5.0*	5.0*	5.0	50.0*	1000	1000	...	...	No	Yes
Cadmium 109 (radionuclide)	014109-32-1	1000	1.00E+00	1.00E-02	1.00E+00*	1.00E-02*	1.0000	1.0000	5000.0	50000.0*	50000.0*	50000.0*	1000	1000	...	...	No	Yes
Cesium 137(+D) (radionuclide)	010045-97-3	10000	1.00E+00	1.00E-02	1.00E+00	1.00E-02	1.0000	1.0000	5.0*	50.0*	5.0*	50.0*	10000	10000	...	...	No	Yes
Cobalt 57 (radionuclide)	013981-50-5	100	1.00E+00	1.00E-02	1.00E+00	1.00E-02	1.0000	1.0000	5000.0*	5000.0*	5000.0	5000.0	100	100	...	...	No	Yes
Cobalt 60 (radionuclide)	010198-40-0	10000	1.00E+00	1.00E-02	1.00E+00	1.00E-02	1.0000	1.0000	5000.0*	5000.0*	5000.0	5000.0	10000	10000	...	...	No	Yes
Iron 55 (radionuclide)	014681-59-5	100	1.00E+00	1.00E-02	1.00E+00	1.00E-02	1.0000	1.0000	5000.0*	5000.0*	5000.0*	5000.0*	100	100	...	...	No	Yes
Lead 210(+D) (radionuclide)	014255-04-0	10000	1.00E+00	1.00E-02	1.00E+00*	1.00E-02*	1.0000	1.0000	5.0*	5000.0	50000.0*	5000.0	10000	10000	...	...	No	Yes
Manganese 54 (radionuclide)	013966-31-9	1000	1.00E+00	1.00E-02	1.00E+00	1.00E-02	1.0000	1.0000	50000.0*	50000.0*	50000.0	50000.0	1000	1000	...	...	No	Yes
Nickel 59 (radionuclide)	014336-70-0	100	1.00E+00	1.00E-02	1.00E+00*	1.00E-02*	1.0000	1.0000	0.5	500.0	500.0	500.0	100	100	...	...	No	Yes
Nickel 63 (radionuclide)	013981-37-8	100	1.00E+00	1.00E-02	1.00E+00*	1.00E-02*	1.0000	1.0000	0.5	500.0	500.0	500.0	100	100	...	...	No	Yes
Plutonium 236 (radionuclide)	015411-92-4	10000	1.00E+00	1.00E-04	...	...	1.0000	1.0000	500.0*	500.0*	500.0*	500.0*	10000	10000	...	...	No	Yes
Plutonium 238 (radionuclide)	013981-16-3	10000	1.00E+00	1.00E-04	...	...	1.0000	1.0000	500.0*	500.0*	500.0*	500.0*	10000	10000	...	...	No	Yes
Plutonium 239 (radionuclide)	015117-48-3	10000	1.00E+00	1.00E-04	...	...	1.0000	1.0000	500.0*	500.0*	500.0*	500.0*	10000	10000	...	...	No	Yes
Plutonium 240 (radionuclide)	014119-33-6	10000	1.00E+00	1.00E-04	...	...	1.0000	1.0000	500.0*	500.0*	500.0*	500.0*	10000	10000	...	...	No	Yes

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

			Ground Water Mobility				Persistence		Bioaccumulation				Ecotoxicity					
			Liquid		Non-Liquid				Food Chain		Environment							
Substance Name	CAS Number	Toxicity	Karst	Non-Karst	Karst	Non-Karst	River	Lake	Fresh	Salt	Fresh	Salt	Fresh	Salt	Air Gas Migration	Air Gas Mobility	Gas	Part
Plutonium 241(+D) (radionuclide)	014119-32-5	10000	1.00E+00	1.00E-04	...	...	1.0000	1.0000	500.0*	500.0*	500.0*	500.0*	10000	10000	...	...	No	Yes
Plutonium 242 (radionuclide)	013982-10-0	10000	1.00E+00	1.00E-04	...	...	1.0000	1.0000	500.0*	500.0*	500.0*	500.0*	10000	10000	...	...	No	Yes
Plutonium 243 (radionuclide)	015706-37-3	100	1.00E+00	1.00E-04	...	...	0.0700	0.0700	500.0*	500.0*	500.0*	500.0*	100	100	...	...	No	Yes
Plutonium 244(+D) (radionuclide)	014119-34-7	10000	1.00E+00	1.00E-04	...	...	1.0000	1.0000	500.0*	500.0*	500.0*	500.0*	10000	10000	...	...	No	Yes
Radium 226(+D) (radionuclide)	013982-63-3	10000	1.00E+00	1.00E-02	1.00E+00*	1.00E-02*	1.0000	1.0000	0.5*	0.5*	0.5*	0.5*	10000	10000	...	...	No	Yes
Radium 228(+D) (radionuclide)	015262-20-1	10000	1.00E+00	1.00E-02	1.00E+00*	1.00E-02*	1.0000	1.0000	0.5*	0.5*	0.5*	0.5*	10000	10000	...	...	No	Yes
Radon 222 (+D)(radionuclide)	014859-67-7	1000	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.0000	0.4000	0.5	0.5	0.5	0.5	1000	1000	17	1.0000	Yes	No
Silver 108m(+D) (radionuclide)	014391-65-2	1000*	1.00E+00	1.00E+00	1.00E+00*	1.00E+00*	1.0000	1.0000	50.0	50000.0*	50.0	50000.0*	1000*	1000*	...	...	No	Yes
Silver 110m (radionuclide)	014391-76-5	1000*	1.00E+00	1.00E+00	1.00E+00*	1.00E+00*	1.0000	1.0000	50.0	50000.0*	50.0	50000.0*	1000*	1000*	...	...	No	Yes
Strontium 90(+D) (radionuclide)	010098-97-2	10000	1.00E+00	1.00E-02	1.00E+00	1.00E-02	1.0000	1.0000	5.0*	5.0*	5.0*	5.0*	10000	10000	...	...	No	Yes
Technetium 99 (radionuclide)**	014133-76-7	1000	1.00E+00	1.00E+00	...	...	1.0000	1.0000	0.5	0.5	0.5	0.5	1000	1000	...	...	No	Yes
Thallium 204 (radionuclide)	013968-51-9	1000*	1.00E+00	1.00E-02*	1.00E+00	1.00E-02*	1.0000	1.0000	500.0	50.0	500.0	50.0	1000*	1000*	...	...	No	Yes
Thorium 227 (radionuclide)	015623-47-9	10000	1.00E+00	1.00E-02*	1.00E+00	1.00E-02*	1.0000	0.4000	0.5*	0.5*	0.5*	0.5*	10000	10000	...	...	No	Yes
Thorium 228(+D) (radionuclide)	014274-82-9	10000	1.00E+00	1.00E-02*	1.00E+00	1.00E-02*	1.0000	1.0000	0.5*	0.5*	0.5*	0.5*	10000	10000	...	...	No	Yes

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

HAZARD RANKING SYSTEM
Hazardous Substance Factor Values

			Ground Water Mobility				Persistence		Bioaccumulation				Ecotoxicity					
			Liquid		Non-Liquid				Food Chain		Environment							
Substance Name	CAS Number	Toxicity	Karst	Non-Karst	Karst	Non-Karst	River	Lake	Fresh	Salt	Fresh	Salt	Fresh	Salt	Air Gas Migration	Air Gas Mobility	Gas	Part
Thorium 229(+D) (radionuclide)	015594-54-4	10000	1.00E+00	1.00E-02*	1.00E+00	1.00E-02*	1.0000	1.0000	0.5*	0.5*	0.5*	0.5*	10000	10000	...	...	No	Yes
Thorium 230 (radionuclide)	014269-63-7	10000	1.00E+00	1.00E-02*	1.00E+00	1.00E-02*	1.0000	1.0000	0.5*	0.5*	0.5*	0.5*	10000	10000	...	...	No	Yes
Thorium 231 (radionuclide)	014932-40-2	1000*	1.00E+00	1.00E-02*	1.00E+00	1.00E-02*	0.4000	0.0700	0.5*	0.5*	0.5*	0.5*	1000*	1000*	...	...	No	Yes
Thorium 232 (radionuclide)	007440-29-1	10000	1.00E+00	1.00E-02*	1.00E+00	1.00E-02*	1.0000	1.0000	0.5*	0.5*	0.5*	0.5*	10000	10000	...	...	No	Yes
Thorium 234 (radionuclide)	015065-10-8	10000*	1.00E+00	1.00E-02*	1.00E+00	1.00E-02*	1.0000	1.0000	0.5*	0.5*	0.5*	0.5*	10000*	10000*	...	...	No	Yes
Tritium	010028-17-8	100	1.00E+00	1.00E+00	...	...	1.0000	1.0000	0.5	0.5	0.5	0.5	100	100	17	1.0000	Yes	No
Uranium 232 (radionuclide)	014158-29-3	10000	1.00E+00	1.00E+00*	2.00E-01*	2.00E-01*	1.0000	1.0000	0.5*	0.5*	0.5*	0.5*	10000	10000	...	...	No	Yes
Uranium 233 (radionuclide)	013968-55-3	10000	1.00E+00	1.00E+00*	2.00E-01*	2.00E-01*	1.0000	1.0000	0.5*	0.5*	0.5*	0.5*	10000	10000	...	...	No	Yes
Uranium 234 (radionuclide)	013966-29-5	10000	1.00E+00	1.00E+00*	2.00E-01*	2.00E-01*	1.0000	1.0000	0.5*	0.5*	0.5*	0.5*	10000	10000	...	...	No	Yes
Uranium 235(+D) (radionuclide)	015117-96-1	10000	1.00E+00	1.00E+00*	2.00E-01*	2.00E-01*	1.0000	1.0000	0.5*	0.5*	0.5*	0.5*	10000	10000	...	...	No	Yes
Uranium 236(+D) (radionuclide)	013982-70-2	10000	1.00E+00	1.00E+00*	2.00E-01*	2.00E-01*	1.0000	1.0000	0.5*	0.5*	0.5*	0.5*	10000	10000	...	...	No	Yes
Uranium 238(+D) (radionuclide)	007440-61-1	10000	1.00E+00	1.00E+00*	2.00E-01*	2.00E-01*	1.0000	1.0000	5000.0*	5000.0*	5000.0*	5000.0*	10000	10000	...	...	No	Yes
Zinc 65 (radionuclide)	013982-39-3	1000	1.00E+00	1.00E-02	1.00E+00*	1.00E-02*	1.0000	1.0000	5.0*	50000.0	50000.0*	50000.0	1000	1000	...	...	No	Yes

5

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

Substance Name	CAS Number	Ground Water/Surface Water Pathway Drinking Water			Surface Water Pathway Food Chain			Surface Water Pathway Environmental			
		MCL/MCLG (mg/L)	Reference Dose Screen Conc (mg/L)	Cancer Risk Screen Conc (mg/L)	FDAAL (ppm)	Ref. Dose Screen Conc (mg/kg)	Cancer Risk Screen Conc (mg/kg)	Acute CMC (µg/L) *		Chronic CCC (µg/L) *	
								Fresh	Salt	Fresh	Salt
Acenaphthene	000083-32-9	...	2.2E+0	...	...	8.1E+1	...	...	...	...	...
Acenaphthylene	000208-96-8	...	...	...	...	...	...	...	...	...	...
Acetone	000067-64-1	...	3.3E+1*	...	...	1.2E+3*	...	...	...	...	...
Acrolein	000107-02-8	...	1.8E-2*	...	...	6.8E-1*	...	...	...	...	...
Acrylamide	000079-06-1	...	7.3E-3	1.9E-5	...	2.7E-1	7.0E-4	...	...	...	...
Alachlor**	015972-60-8	2.0E-3	3.6E-1	1.1E-3	...	1.4E+1	3.9E-2	...	...	...	...
Aldrin	000309-00-2	...	1.1E-3	5.0E-6	3.0E-1	4.1E-2	1.9E-4	3.0E+0[G]	1.3E+0[G]	...	...
Aluminum	007429-90-5	...	...	...	...	...	...	7.5E+2[G2, I2]	...	8.7E+1[G2, I2, L2]	...
Americium**	007440-35-9	...	...	...	...	...	...	...	...	...	...
Aniline	000062-53-3	...	...	1.5E-2	...	...	5.5E-1	...	...	...	...
Anthracene	000120-12-7	...	1.1E+1	...	...	4.1E+2	...	...	...	...	...
Antimony	007440-36-0	6.0E-3	1.5E-2	...	...	5.4E-1	...	...	...	...	...
Arsenic	007440-38-2	1.0E-2*	1.1E-2	5.7E-5	...	4.1E-1	2.1E-3	3.4E+2[A, D, K]	6.9E+1[A, D, bb]	1.5E+2[A, D, K]	3.6E+1[A, D, bb]
Asbestos	001332-21-4	7.0E+0 million fibers/L	...	...	...	...	...	...	...	...	...

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

HAZARD RANKING SYSTEM
Hazardous Substance Benchmarks

		Ground Water/Surface Water Pathway Drinking Water			Surface Water Pathway Food Chain			Surface Water Pathway Environmental			
								Acute CMC (µg/L) *		Chronic CCC (µg/L) *	
Substance Name	CAS Number	MCL/MCLG (mg/L)	Reference Dose Screen Conc (mg/L)	Cancer Risk Screen Conc (mg/L)	FDAAL (ppm)	Ref. Dose Screen Conc (mg/kg)	Cancer Risk Screen Conc (mg/kg)	Fresh	Salt	Fresh	Salt
Barium	007440-39-3	2.0E+0	2.6E+0	...	...	9.5E+1	...	...	...	...	...
Benz(a)anthracene	000056-55-3	...	...	1.2E-4	...	...	4.3E-3	...	...	...	...
Benzene	000071-43-2	5.0E-3	1.5E-1*	1.5E-3	...	5.4E+0*	5.7E-2*	...	...	...	...
Benzidine	000092-87-5	...	1.1E-1	3.7E-7	...	4.1E+0	1.4E-5	...	...	...	...
Benzo(a)pyrene	000050-32-8	2.0E-4	...	1.2E-5	...	...	4.3E-4	...	...	...	...
Benzo(g,h,i)perylene	000191-24-2	...	...	...	...	...	...	...	...	...	...
Benzo(j,k)fluorene (Fluoranthene)	000206-44-0	...	1.5E+0	...	...	5.4E+1	...	...	...	...	...
Benzo(k)fluoranthene	000207-08-9	...	...	1.2E-3	...	...	4.3E-2	...	...	...	...
Beryllium	007440-41-7	4.0E-3	7.3E-2*	...*	...	2.7E+0*	...*	...	...	...	...
Bis (2-ethylhexyl) phthalate	000117-81-7	6.0E-3	7.3E-1	6.1E-3	...	2.7E+1	2.3E-1	...	...	...	...
Boron	007440-42-8	...	3.3E+0	...	...	1.2E+2	...	...	...	...	...
Bromodichloromethane	000075-27-4	...*	7.3E-1	1.4E-3	...	2.7E+1	5.1E-2	...	...	...	...
Butylbenzyl phthalate	000085-68-7	...	7.3E+0	...	...	2.7E+2	...	...	...	...	...
Cadmium	007440-43-9	5.0E-3	1.8E-2	...	...	6.8E-1	...	2.0E+0 [D, E, K, bb]	4.0E+1 [D, bb]	2.5E-1 [D, E, K, bb]	8.8E+0 [D, bb]

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

		Ground Water/Surface Water Pathway Drinking Water			Surface Water Pathway Food Chain			Surface Water Pathway Environmental			
								Acute CMC (µg/L) *		Chronic CCC (µg/L) *	
Substance Name	CAS Number	MCL/MCLG (mg/L)	Reference Dose Screen Conc (mg/L)	Cancer Risk Screen Conc (mg/L)	FDAAL (ppm)	Ref. Dose Screen Conc (mg/kg)	Cancer Risk Screen Conc (mg/kg)	Fresh	Salt	Fresh	Salt
Carbazole	000086-74-8	...	...	4.3E-3	...	...	1.6E-1	...	...	...	...
Carbon disulfide	000075-15-0	...	3.7E+0	...	...	1.4E+2	...	...	...	...	...
Carbon tetrachloride	000056-23-5	5.0E-3	2.6E-2	6.6E-4	...	9.5E-1	2.4E-2	...	...	...	...
Cesium	007440-46-2	...	...	...	...	...	...	...	...	...	...
Chlordane	000057-74-9	2.0E-3	1.8E-2	2.4E-4	3.0E-1	6.8E-1*	9.0E-3	2.4E+0[G]	9.0E-2[G]	4.3E-3[G, aa]	4.0E-3[G, aa]
Chlordane, alpha-	005103-71-9	...	1.8E-2*	2.4E-4*	...	6.8E-1*	9.0E-3*	...	...	...	...
Chlordane, gama-	005566-34-7	...	1.8E-2*	2.4E-4*	...	6.8E-1*	9.0E-3*	...	...	...	...
Chlorobenzene	000108-90-7	1.0E-1	7.3E-1	...	...	2.7E+1	...	...	...	...	...
Chloroform	000067-66-3	...*	3.6E-1	...*	...	1.4E+1	...*	...	...	...	...
Chromium	007440-47-3	1.0E-1	1.1E-1*	...	...	4.1E+0*	...	...	...	...	...
Chromium(III)	016065-83-1	...	5.5E+1*	...	...	2.0E+3*	...	5.7E+2[D, E, K]	...	7.4E+1[D, E, K]	...
Chromium(VI)	018540-29-9	...	1.1E-1*	...	...	4.1E+0*	...	1.6E+1[D, K]	1.1E+3[D, bb]	1.1E+1[D, K]	5.0E+1[D, bb]
Chrysene	000218-01-9	...	...	1.2E-2	...	...	4.3E-1	...	...	...	...

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

Substance Name	CAS Number	Ground Water/Surface Water Pathway Drinking Water			Surface Water Pathway Food Chain			Surface Water Pathway Environmental			
		MCL/MCLG (mg/L)	Reference Dose Screen Conc (mg/L)	Cancer Risk Screen Conc (mg/L)	FDAAL (ppm)	Ref. Dose Screen Conc (mg/kg)	Cancer Risk Screen Conc (mg/kg)	Acute CMC (µg/L) *		Chronic CCC (µg/L) *	
								Fresh	Salt	Fresh	Salt
Cobalt	007440-48-4	...	...	...	...	...	...	...	...	...	...
Copper	007440-50-8	1.3E+0	...	...	...	...	...	1.3E+1[D, E, K, cc]	4.8E+0[D, cc, ff]	9.0E+0[D, E, K, cc]	3.1E+0[D, cc, ff]
Cumene	000098-82-8	...	3.7E+0*	...	...	1.4E+2*	...	...	...	...	...
Cyanamide**	000420-04-2	...	...	...	...	...	...	...	...	...	...
Cyanide	000057-12-5	2.0E-1	7.3E-1	...	...	2.7E+1	...	2.2E+1[K, Q]	1.0E+0[Q, bb]	5.2E+0[K, Q]	1.0E+0[Q, bb]
DDD	000072-54-8	...	...	3.5E-4	...*	...	1.3E-2	...	...	...	...
DDE	000072-55-9	...	...	2.5E-4	5.0E+0	...	9.3E-3	...	...	...	...
DDT	000050-29-3	...	1.8E-2	2.5E-4	5.0E+0	6.8E-1	9.3E-3	1.1E+0[G, ii]	1.3E-1[G, ii]	1.0E-3[G, aa, ii]	1.0E-3[G, aa, ii]
Di-n-butyl phthalate	000084-74-2	...	3.7E+0	...	...	1.4E+2	...	...	...	...	...
Di-n-octyl phthalate	000117-84-0	...	7.3E-1	...	...	2.7E+1	...	...	...	...	...
Dibenz(a,h)anthracene	000053-70-3	...	...	1.2E-5	...	...	4.3E-4	...	...	...	...
Dibenzofuran	000132-64-9	...	1.5E-1*	...	...	5.4E+0*	...	...	...	...	...
Dibromo-3-chloropropane, 1,2-	000096-12-8	2.0E-4	...	6.1E-5	...	...	2.3E-3	...	...	...	...
Dibromoethane, 1,2-	000106-93-4	...*	...	1.0E-6	...	...	3.7E-5	...	...	...	...

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

		Ground Water/Surface Water Pathway Drinking Water			Surface Water Pathway Food Chain			Surface Water Pathway Environmental			
								Acute CMC (μg/L) *		Chronic CCC (μg/L) *	
Substance Name	CAS Number	MCL/MCLG (mg/L)	Reference Dose Screen Conc (mg/L)	Cancer Risk Screen Conc (mg/L)	FDAAL (ppm)	Ref. Dose Screen Conc (mg/kg)	Cancer Risk Screen Conc (mg/kg)	Fresh	Salt	Fresh	Salt
Dichlorobenzene, 1,4-	000106-46-7	7.5E-2	...	3.5E-3	...	...	1.3E-1	...	...	...	...
Dichloroethane, 1,1-	000075-34-3	...	3.7E+0	...	...	1.4E+2	...	...	...	...	...
Dichloroethane, 1,2-	000107-06-2	5.0E-3	...	9.4E-4	...	...	3.5E-2	...	...	...	...
Dichloroethylene, 1,1-	000075-35-4	7.0E-3	1.8E+0*	...*	...	6.8E+1*	...*	...	...	...	...
Dichloroethylene, 1,2-**	000540-59-0	...	3.3E-1	...	...	1.2E+1	...	...	...	...	...
24 Dichloroethylene, cis-1,2-	000156-59-2	7.0E-2	3.6E-1	...	...	1.4E+1	...	...	...	...	...
Dichloroethylene, trans-1,2-	000156-60-5	1.0E-1	7.3E-1	...	...	2.7E+1	...	...	...	...	...
Dichlorophenol, 2,4-	000120-83-2	...	1.1E-1	...	...	4.1E+0	...	...	...	...	...
Dichloropropane, 1,2-	000078-87-5	5.0E-3	...	1.3E-3	...	...	4.6E-2	...	...	...	...
Dichloropropene, 1,3-	000542-75-6	...	1.1E+0*	8.5E-4	...	4.1E+1*	3.2E-2	...	...	...	...
Dieldrin	000060-57-1	...	1.8E-3	5.3E-6	3.0E-1	6.8E-2	2.0E-4	2.4E-1[K]	7.1E-1[G]	5.6E-2[K, O]	1.9E-3[G, aa]
Diethyl phthalate	000084-66-2	...	2.9E+1	...	...	1.1E+3	...	...	...	...	...
Dimethyl phenol, 2,4-	000105-67-9	...	7.3E-1	...	...	2.7E+1	...	...	...	...	...

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

		Ground Water/Surface Water Pathway Drinking Water			Surface Water Pathway Food Chain			Surface Water Pathway Environmental			
								Acute CMC (µg/L) *		Chronic CCC (µg/L) *	
Substance Name	CAS Number	MCL/MCLG (mg/L)	Reference Dose Screen Conc (mg/L)	Cancer Risk Screen Conc (mg/L)	FDAAL (ppm)	Ref. Dose Screen Conc (mg/kg)	Cancer Risk Screen Conc (mg/kg)	Fresh	Salt	Fresh	Salt
Dinitrobenzene, 1,3-	000099-65-0	...	3.7E-3	...	...	1.4E-1	...	...	...	...	...
Dioxin 1,4-**	000290-67-5	...	...	...	...	...	...	...	...	...	...
Diphenylhydrazine, 1,2-	000122-66-7	...	...	1.1E-4	...	...	3.9E-3	...	...	...	...
Disulfoton	000298-04-4	...	1.5E-3	...	...	5.4E-2	...	...	...	...	...
Endosulfan (I or II)	000115-29-7	...	2.2E-1	...	...	8.1E+0	...	...	...	...	...
Endosulfan I**	000959-98-8	...	2.2E-1	...	...	8.1E+0	...	2.2E-1[G, Y]	3.4E-2[G, Y]	5.6E-2[G, Y]	8.7E-3[G, Y]
Endosulfan II**	033213-65-9	...	2.2E-1	...	...	8.1E+0	...	2.2E-1[G, Y]	3.4E-2[G, Y]	5.6E-2[G, Y]	8.7E-3[G, Y]
Endrin	000072-20-8	2.0E-3	1.1E-2	...	...	4.1E-1	...	8.6E-2[K]	3.7E-2[G]	3.6E-2[K, O]	2.3E-3[G, aa]
Endrin aldehyde	007421-93-4	...	...	...	...	...	...	...	...	...	...
Ethyl benzene	000100-41-4	7.0E-1	3.7E+0	...	...	1.4E+2	...	...	...	...	...
Ethyl chloride	000075-00-3	...	...	...	...	...	...	...	...	...	...
Ethylene glycol monobutyl ether (EBGE)**	000111-76-2	...	1.8E+1	...	...	6.8E+2	...	...	...	...	...
Fluorene	000086-73-7	...	1.5E+0	...	...	5.4E+1	...	...	...	...	...
Fluorine	007782-41-4	...	2.2E+0	...	...	8.1E+1	...	...	...	...	...

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

Substance Name	CAS Number	Ground Water/Surface Water Pathway Drinking Water: MCL/MCLG (mg/L)	Ground Water/Surface Water Pathway Drinking Water: Reference Dose Screen Conc (mg/L)	Ground Water/Surface Water Pathway Drinking Water: Cancer Risk Screen Conc (mg/L)	Surface Water Pathway Food Chain: FDAAL (ppm)	Surface Water Pathway Food Chain: Ref. Dose Screen Conc (mg/kg)	Surface Water Pathway Food Chain: Cancer Risk Screen Conc (mg/kg)	Surface Water Pathway Environmental: Acute CMC (µg/L) * Fresh	Surface Water Pathway Environmental: Acute CMC (µg/L) * Salt	Surface Water Pathway Environmental: Chronic CCC (µg/L) * Fresh	Surface Water Pathway Environmental: Chronic CCC (µg/L) * Salt
Heptachlor	000076-44-8	4.0E-4	1.8E-2	1.9E-5	3.0E-1	6.8E-1	7.0E-4	5.2E-1[G]	5.3E-2[G]	3.8E-3[G, aa]	3.6E-3[G, aa]
Heptachlor epoxide, alpha, beta, gamma	001024-57-3	2.0E-4	4.7E-4	9.4E-6	3.0E-1	1.8E-2	3.5E-4	5.2E-1[G, V]	5.3E-2[G, V]	3.8E-3[G, V, aa]	3.6E-3[G, V, aa]
Heptachlorodibenzo-p-dioxin**	037871-00-4	...	...	...	...	...	...	...	...	...	...
Heptachlorodibenzo-p-dioxin 1,2,3,4,6,7,8-	035822-46-9	...	...	5.7E-7	...	...	2.1E-5	...	...	...	...
Heptachlorodibenzofuran 1,2,3,4,6,7,8-	067562-39-4	...	...	5.7E-7	...	...	2.1E-5	...	...	...	...
Heptachlorodibenzofuran 1,2,3,4,7,8,9-	055673-89-7	...	...	5.7E-7*	...	...	2.1E-5*	...	...	...	...
Hexabromobiphenyl (PBB)**	036355-01-8	...	...	...	...	...	...	...	...	...	...
Hexachlorobenzene	000118-74-1	1.0E-3	2.9E-2	5.3E-5	...	1.1E+0	2.0E-3	...	...	...	...
Hexachlorobutadiene	000087-68-3	...	7.3E-3	1.1E-3	...	2.7E-1	4.0E-2	...	...	...	...
Hexachlorocyclohexane, alpha-	000319-84-6	...	...	1.4E-5	...	...	5.0E-4	...	...	...	...
Hexachlorocyclohexane, beta-	000319-85-7	...	...	4.7E-5	...	...	1.8E-3	...	...	...	...
Hexachlorodibenzo-p-dioxin 1,2,3,4,7,8-	039227-28-6	...	...	1.4E-8	...	...	5.3E-7	...	...	...	...
Hexachlorodibenzo-p-dioxin 1,2,3,6,7,8-	057653-85-7	...	...	1.4E-8	...	...	5.3E-7	...	...	...	...
Hexachlorodibenzo-p-dioxin 1,2,3,7,8,9-	019408-74-3	...	...	1.4E-8	...	...	5.1E-7	...	...	...	...

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

Substance Name	CAS Number	Ground Water/Surface Water Pathway Drinking Water			Surface Water Pathway Food Chain			Surface Water Pathway Environmental			
		MCL/MCLG (mg/L)	Reference Dose Screen Conc (mg/L)	Cancer Risk Screen Conc (mg/L)	FDAAL (ppm)	Ref. Dose Screen Conc (mg/kg)	Cancer Risk Screen Conc (mg/kg)	Acute CMC (µg/L) *		Chronic CCC (µg/L) *	
								Fresh	Salt	Fresh	Salt
Hexachlorodibenzofuran 1,2,3,4,7,8-	070648-26-9	...	...	5.7E-8	...	...	2.1E-6	...	...	...	...
Hexachlorodibenzofuran 1,2,3,6,7,8-	057117-44-9	...	...	5.7E-8	...	...	2.1E-6	...	...	...	...
Hexachlorodibenzofuran 1,2,3,7,8,9-	072918-21-9	...	...	5.7E-8	...	...	2.1E-6	...	...	...	...
Hexachlorodibenzofuran 2,3,4,6,7,8-	060851-34-5	...	...	5.7E-8	...	...	2.1E-6	...	...	...	...
Hydrazine	000302-01-2	...	...	2.8E-5	...	...	1.1E-3	...	...	...	...
Hydrogen sulfide	007783-06-4	...	1.1E+0*	...	...	4.1E+1*	...	...	...	2.0E+0[F2]	2.0E+0[F2]
Indeno(1,2,3-cd)pyrene	000193-39-5	...	...	1.2E-4	...	...	4.3E-3	...	...	...	...
Iron	007439-89-6	...	...	...	...	...	...	...	...	1.0E+3[F2]	...
Lead	007439-92-1	1.5E-2	...	...	...	...	...	6.5E+1[D, E, bb, gg]	2.1E+2[D, bb]	2.5E+0[D, E, bb, gg]	8.1E+0[D, bb]
Lead chromate**	007758-97-6	...	...	...	...	...	...	...	...	...	...
Lindane	000058-89-9	2.0E-4	1.1E-2	6.6E-5	...	4.1E-1	2.4E-3	9.5E-1[K]	1.6E-1[G]	...	...
Manganese	007439-96-5	...	5.1E+0	...	...	1.9E+2	...	...	...	...	...
Mercury	007439-97-6	2.0E-3	1.1E-2	...	1.0E+0	4.1E-1	...	1.4E+0[D, K, hh]	1.8E+0[D, ee, hh]	7.7E-1[D, K, hh]	9.4E-1[D, ee, hh]

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

Substance Name	CAS Number	Ground Water/Surface Water Pathway Drinking Water: MCL/MCLG (mg/L)	Reference Dose Screen Conc (mg/L)	Cancer Risk Screen Conc (mg/L)	Surface Water Pathway Food Chain: FDAAL (ppm)	Ref. Dose Screen Conc (mg/kg)	Cancer Risk Screen Conc (mg/kg)	Surface Water Pathway Environmental: Acute CMC (µg/L) * Fresh	Acute CMC (µg/L) * Salt	Chronic CCC (µg/L) * Fresh	Chronic CCC (µg/L) * Salt
Methoxychlor	000072-43-5	4.0E-2	1.8E-1	...	...	6.8E+0	...	...	...	3.0E-2[F2]	3.0E-2[F2]
Methyl Parathion	000298-00-0	...	9.1E-3	...	...	3.4E-1	...	...	...	...	...
Methyl ethyl ketone	000078-93-3	...	2.2E+1	...	...	8.1E+2	...	...	...	...	...
Methyl isobutyl ketone	000108-10-1	...	2.9E+0	...	...	1.1E+2	...	...	...	...	...
Methyl phenol, 4-	000106-44-5	...	1.8E-1	...	...	6.8E+0	...	...	...	...	...
Methyl tert-butyl ether (MTBE)**	001634-04-4	...	...	...	...	...	...	...	...	...	...
Methylene chloride (dichloromethane)	000075-09-2	5.0E-3	2.2E+0	1.1E-2	...	8.1E+1	4.2E-1	...	...	...	...
Methylnaphthalene, 2-	000091-57-6	...	...	...	...	...	...	...	...	...	...
Naphthalene	000091-20-3	...	1.5E+0	...	...	5.4E+1	...	...	...	...	...
Nickel	007440-02-0	...	7.3E-1	...	...	2.7E+1	...	4.7E+2[D, E, K]	7.4E+1[D, bb]	5.2E+1[D, E, K]	8.2E+0[D, bb]
Nitrosodiphenylamine, N-	000086-30-6	...	...	1.7E-2	...	...	6.4E-1	...	...	...	...
Pentachlorodibenzo-p-dioxin 1,2,3,7,8-	040321-76-4	...	...	1.1E-9	...	...	4.2E-8	...	...	...	...
Pentachlorodibenzofuran 1,2,3,7,8-	057117-41-6	...	...	...*	...	...	...*	...	...	...	...
Pentachlorodibenzofuran 2,3,4,7,8-**	057117-31-4	...	...	5.7E-9	...	...	2.1E-7	...	...	...	...

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

Substance Name	CAS Number	Ground Water/Surface Water Pathway Drinking Water			Surface Water Pathway Food Chain			Surface Water Pathway Environmental			
		MCL/MCLG (mg/L)	Reference Dose Screen Conc (mg/L)	Cancer Risk Screen Conc (mg/L)	FDAAL (ppm)	Ref. Dose Screen Conc (mg/kg)	Cancer Risk Screen Conc (mg/kg)	Acute CMC (µg/L) * Fresh	Acute CMC (µg/L) * Salt	Chronic CCC (µg/L) * Fresh	Chronic CCC (µg/L) * Salt
Pentachlorophenol (PCP)	000087-86-5	1.0E-3	1.1E+0	7.1E-4	...	4.1E+1	2.6E-2	1.9E+1[F, K]	1.3E+1[bb]	1.5E+1[F, K]	7.9E+0[bb]
Perchlorate**	014797-73-0	...	3.7E-3	...	...	1.4E-1	...	...	...	...	...
Phenanthrene	000085-01-8	...	...	...	...	...	...	...	...	...	...
Phenol	000108-95-2	...	1.1E+1*	...	...	4.1E+2*	...	...	...	...	...
Plutonium	007440-07-5	...	...	...	...	...	...	...	...	...	...
Polychlorinated biphenyls (PCBs)	001336-36-3	5.0E-4	7.3E-4	4.3E-5	...	2.7E-2	1.6E-3	...	...	1.4E-2[N, aa]	3.0E-2[N, aa]
Pyrene	000129-00-0	...	1.1E+0	...	...	4.1E+1	...	...	...	...	...
Radium	007440-14-4	...	...	...	...	...	...	...	...	...	...
Radon	010043-92-2	...	...	...	...	...	...	...	...	...	...
Selenium	007782-49-2	5.0E-2	1.8E-1	...	...	6.8E+0	...	...[L, R, T]	2.9E+2[D, bb, dd]	5.0E+0[T]	7.1E+1[D, bb, dd]
Silver	007440-22-4	...	1.8E-1	...	...	6.8E+0	...	3.2E+0[D, E, G]	1.9E+0[D, G]	...	...
Strontium	007440-24-6	...	...	...	...	...	...	...	...	...	...
Styrene	000100-42-5	1.0E-1	7.3E+0	...	...	2.7E+2	...	...	...	...	...

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

Substance Name	CAS Number	Ground Water/Surface Water Pathway Drinking Water			Surface Water Pathway Food Chain			Surface Water Pathway Environmental			
		MCL/MCLG (mg/L)	Reference Dose Screen Conc (mg/L)	Cancer Risk Screen Conc (mg/L)	FDAAL (ppm)	Ref. Dose Screen Conc (mg/kg)	Cancer Risk Screen Conc (mg/kg)	Acute CMC (µg/L) *		Chronic CCC (µg/L) *	
								Fresh	Salt	Fresh	Salt
Tetrachlorobenzene, 1,2,4,5-	000095-94-3	...	1.1E-2	...	...	4.1E-1	...	...	...	...	...
Tetrachlorodibenzo-p-dioxin**	041903-57-5	...	...	...	...	...	...	...	...	...	...
Tetrachlorodibenzo-p-dioxin 2,3,7,8- (TCDD)	001746-01-6	3.0E-8	...	5.7E-10	...	...	2.1E-8	...	...	...	...
Tetrachlorodibenzofuran 2,3,7,8-	051207-31-9	...	...	5.7E-9	...	...	2.1E-7	...	...	...	...
Tetrachloroethane, 1,1,2,2-	000079-34-5	...	...	4.3E-4	...	...	1.6E-2	...	...	...	...
Tetrachloroethylene	000127-18-4	5.0E-3	3.6E-1	1.6E-3	...	1.4E+1	6.1E-2	...	...	...	...
Thallium	007440-28-0	5.0E-4	...	...	...	...	...	...	...	...	...
Toluene	000108-88-3	1.0E+0	7.3E+0	...	...	2.7E+2	...	...	...	...	...
Toxaphene	008001-35-2	3.0E-3	...	7.7E-5	...	...	2.9E-3	7.3E-1	2.1E-1	2.0E-4[aa]	2.0E-4[aa]
Trichlorobenzene, 1,2,4-	000120-82-1	7.0E-2	3.6E-1	...	...	1.4E+1	...	...	...	...	...
Trichloroethane, 1,1,1-	000071-55-6	2.0E-1	...	...	...	...	...	...	...	...	...
Trichloroethane, 1,1,2-	000079-00-5	3.0E-3	1.5E-1	1.5E-3	...	5.4E+0	5.5E-2	...	...	...	...
Trichloroethylene (TCE)	000079-01-6	5.0E-3	...	7.7E-3	...	...	2.9E-1	...	...	...	...
Trichlorofluoromethane	000075-69-4	...	1.1E+1	...	...	4.1E+2	...	...	...	...	...

30

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

Substance Name	CAS Number	Ground Water/Surface Water Pathway Drinking Water			Surface Water Pathway Food Chain			Surface Water Pathway Environmental			
		MCL/MCLG (mg/L)	Reference Dose Screen Conc (mg/L)	Cancer Risk Screen Conc (mg/L)	FDAAL (ppm)	Ref. Dose Screen Conc (mg/kg)	Cancer Risk Screen Conc (mg/kg)	Acute CMC (µg/L) *		Chronic CCC (µg/L) *	
								Fresh	Salt	Fresh	Salt
Trichlorophenol, 2,4,6-	000088-06-2	...	...	7.7E-3	...	...	2.9E-1	...	...	...	...
Trichloropropane, 1,2,3-	000096-18-4	...	2.2E-1	1.2E-5	...	8.1E+0	4.5E-4	...	...	...	...
Trifluralin (Treflan)	001582-09-8	...	2.7E-1	1.1E-2	...	1.0E+1	4.1E-1	...	...	...	...
Trinitrobenzene, 1,3,5-	000099-35-4	...	1.1E+0*	...	...	4.1E+1*	...	...	...	...	...
Vanadium	007440-62-2	...	2.6E-1	...	...	9.5E+0	...	...	...	...	...
Vinyl acetate	000108-05-4	...	3.7E+1	...	...	1.4E+3	...	...	...	...	...
Vinyl chloride	000075-01-4	2.0E-3	1.1E-1*	5.7E-5	...	4.1E+0*	2.1E-3	...	...	...	...
Xylene**	001330-20-7	...	7.3E+0	...	...	2.7E+2	...	...	...	...	...
Xylene, m-	000108-38-3	1.0E+1	7.3E+1	...	...	2.7E+3	...	...	...	...	...
Xylene, o-	000095-47-6	1.0E+1	7.3E+1	...	...	2.7E+3	...	...	...	...	...
Xylene, p-	000106-42-3	1.0E+1	...	...	...	...	...	...	...	...	...
Zinc	007440-66-6	...	1.1E+1	...	...	4.1E+2	...	1.2E+2[D, E, K]	9.0E+1[D, bb]	1.2E+2[D, E, K]	8.1E+1[D, bb]

31

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

HAZARD RANKING SYSTEM
Hazardous Substance Benchmarks

Substance Name	CAS Number	AIR PATHWAY NAAQS NESHAPS (ug/m^3)	AIR PATHWAY Reference Dose Screen Conc (mg/m^3)	AIR PATHWAY Cancer Risk Screen Conc (mg/m^3)	SOIL PATHWAY Reference Dose Screen Conc (mg/kg)	SOIL PATHWAY Cancer Risk Screen Conc (mg/kg)
Acenaphthene	000083-32-9	...	...	...	4.7E+3	...
Acenaphthylene	000208-96-8	...	...	...	...	...
Acetone	000067-64-1	...	...	...	7.0E+4*	...
Acrolein	000107-02-8	...	2.1E-5	...	3.9E+1*	...
Acrylamide	000079-06-1	...	...	1.9E-6	1.6E+1	1.4E-1
Alachlor**	015972-60-8	...	...	...	7.8E+2	8.0E+0
Aldrin	000309-00-2	...	...	5.0E-7	2.3E+0	3.8E-2
Aluminum	007429-90-5	...	...	...	...	...
Americium**	007440-35-9	...	...	...	...	...
Aniline	000062-53-3	...	1.0E-3	...	...	1.1E+2*
Anthracene	000120-12-7	...	...	...	2.3E+4*	...
Antimony	007440-36-0	...	4.2E-4*	...	3.1E+1	...
Arsenic	007440-38-2	...	...	5.7E-7	2.3E+1	4.3E-1
Asbestos	001332-21-4	...	...	Inhal Unit Risk: 2.3E-1 fibers/mL*	...	...

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

32

HAZARD RANKING SYSTEM
Hazardous Substance Benchmarks

Substance Name	CAS Number	AIR PATHWAY NAAQS NESHAPS (ug/m^3)	AIR PATHWAY Reference Dose Screen Conc (mg/m^3)	AIR PATHWAY Cancer Risk Screen Conc (mg/m^3)	SOIL PATHWAY Reference Dose Screen Conc (mg/kg)	SOIL PATHWAY Cancer Risk Screen Conc (mg/kg)
Barium	007440-39-3	...	5.2E-4	...	5.5E+3	...
Benz(a)anthracene	000056-55-3	...	...	...	...	8.8E-1
Benzene	000071-43-2	...	3.1E-2*	3.1E-4	3.1E+2*	1.2E+1*
Benzidine	000092-87-5	...	...	3.6E-8	2.3E+2	2.8E-3
Benzo(a)pyrene	000050-32-8	...	...	...	...	8.8E-2
Benzo(g,h,i)perylene	000191-24-2	...	...	...	...	...
Benzo(j,k)fluorene (Fluoranthene)	000206-44-0	...	...	...	3.1E+3	...
Benzo(k)fluoranthene	000207-08-9	...	...	...	...	8.8E+0
Beryllium	007440-41-7	1.0E-2	2.1E+1*	1.0E-6	1.6E+2*	...*
Bis (2-ethylhexyl) phthalate	000117-81-7	...	...	...	1.6E+3	4.6E+1*
Boron	007440-42-8	...	2.1E-2	...	7.0E+3	...
Bromodichloromethane	000075-27-4	...	...	...	1.6E+3	1.0E+1
Butylbenzyl phthalate	000085-68-7	...	...	...	1.6E+4*	...
Cadmium	007440-43-9	...	9.4E-4*	1.4E-6	3.9E+1	...

33

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

		AIR PATHWAY			SOIL PATHWAY	
Substance Name	CAS Number	NAAQS NESHAPS (ug/m^3)	Reference Dose Screen Conc (mg/m^3)	Cancer Risk Screen Conc (mg/m^3)	Reference Dose Screen Conc (mg/kg)	Cancer Risk Screen Conc (mg/kg)
Carbazole	000086-74-8	...	...	...	...	3.2E+1*
Carbon disulfide	000075-15-0	...	7.3E-1	...	7.8E+3	...
Carbon tetrachloride	000056-23-5	...	2.1E-2*	1.6E-4	5.5E+1	4.9E+0
Cesium	007440-46-2	...	...	...	...	...
Chlordane	000057-74-9	...	7.3E-4*	2.4E-5	3.9E+1*	1.8E+0*
Chlordane, alpha-	005103-71-9	...	7.3E-4*	2.4E-5*	3.9E+1*	1.8E+0*
Chlordane, gama-	005566-34-7	...	7.3E-4*	2.4E-5*	3.9E+1*	1.8E+0*
Chlorobenzene	000108-90-7	...	2.1E-2	...	1.6E+3	...
Chloroform	000067-66-3	...	...	1.1E-4	7.8E+2	...*
Chromium	007440-47-3	...	8.3E-6*	...*	2.3E+2*	...
Chromium(III)	016065-83-1	...	...	...	1.2E+5*	...
Chromium(VI)	018540-29-9	...	8.3E-6*	2.0E-7	2.3E+2*	...
Chrysene	000218-01-9	...	...	...	...	8.8E+1*
Cobalt	007440-48-4	...	...	...	...	...
Copper	007440-50-8	...	...	...	...	...

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

34

		AIR PATHWAY			SOIL PATHWAY	
Substance Name	CAS Number	NAAQS NESHAPS (ug/m^3)	Reference Dose Screen Conc (mg/m^3)	Cancer Risk Screen Conc (mg/m^3)	Reference Dose Screen Conc (mg/kg)	Cancer Risk Screen Conc (mg/kg)
Cumene	000098-82-8	...	4.2E-1*	...	7.8E+3*	...
Cyanamide**	000420-04-2	...	...	...	...	...
Cyanide	000057-12-5	...	...	...	1.6E+3	...
DDD	000072-54-8	...	...	...	...	2.7E+0
DDE	000072-55-9	...	...	...	...	1.9E+0
DDT	000050-29-3	...	...	2.5E-5	3.9E+1	1.9E+0
Di-n-butyl phthalate	000084-74-2	...	...	...	7.8E+3	...
Di-n-octyl phthalate	000117-84-0	...	...	...	1.6E+3	...
Dibenz(a,h)anthracene	000053-70-3	...	...	...	...	8.8E-2
Dibenzofuran	000132-64-9	...	...	...	3.1E+2*	...
Dibromo-3-chloropropane, 1,2-	000096-12-8	...	2.1E-4	3.5E-3	...	4.6E-1
Dibromoethane, 1,2-	000106-93-4	...	2.1E-4	1.1E-5	...	7.5E-3
Dichlorobenzene, 1,4-	000106-46-7	...	8.3E-1	...	...	2.7E+1*
Dichloroethane, 1,1-	000075-34-3	...	5.2E-1*	...	7.8E+3	...

35

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

		AIR PATHWAY			SOIL PATHWAY	
Substance Name	CAS Number	NAAQS NESHAPS (ug/m^3)	Reference Dose Screen Conc (mg/m^3)	Cancer Risk Screen Conc (mg/m^3)	Reference Dose Screen Conc (mg/kg)	Cancer Risk Screen Conc (mg/kg)
Dichloroethane, 1,2-	000107-06-2	...	...	9.4E-5	...	7.0E+0
Dichloroethylene, 1,1-	000075-35-4	...	2.1E-1*	7.1E-6	3.9E+3*	...*
Dichloroethylene, 1,2-**	000540-59-0	...	...	...	7.0E+2	...
Dichloroethylene, cis-1,2-	000156-59-2	...	...	...	7.8E+2	...
Dichloroethylene, trans-1,2-	000156-60-5	...	...	...	1.6E+3	...
Dichlorophenol, 2,4-	000120-83-2	...	...	...	2.3E+2	...
Dichloropropane, 1,2-	000078-87-5	...	4.2E-3	...	...	9.4E+0
Dichloropropene, 1,3-	000542-75-6	...	2.1E-2	6.1E-4	2.3E+3*	6.4E+0*
Dieldrin	000060-57-1	...	...	5.3E-7	3.9E+0	4.0E-2
Diethyl phthalate	000084-66-2	...	...	...	6.3E+4*	...
Dimethyl phenol, 2,4-	000105-67-9	...	...	...	1.6E+3	...
Dinitrobenzene, 1,3-	000099-65-0	...	...	...	7.8E+0	...
Dioxin 1,4-**	000290-67-5	...	...	...	...	...
Diphenylhydrazine, 1,2-	000122-66-7	...	...	1.1E-5	...	8.0E-1
Disulfoton	000298-04-4	...	...	...	3.1E+0	...

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

36

Substance Name	CAS Number	AIR PATHWAY NAAQS NESHAPS (ug/m^3)	AIR PATHWAY Reference Dose Screen Conc (mg/m^3)	AIR PATHWAY Cancer Risk Screen Conc (mg/m^3)	SOIL PATHWAY Reference Dose Screen Conc (mg/kg)	SOIL PATHWAY Cancer Risk Screen Conc (mg/kg)
Endosulfan (I or II)	000115-29-7	...	...	...	4.7E+2	...
Endosulfan I**	000959-98-8	...	...	...	4.7E+2	...
Endosulfan II**	033213-65-9	...	...	...	4.7E+2	...
Endrin	000072-20-8	...	...	...	2.3E+1	...
Endrin aldehyde	007421-93-4	...	...	...	...	...
Ethyl benzene	000100-41-4	...	1.0E+0	...	7.8E+3	...
Ethyl chloride	000075-00-3	...	1.0E+1	...	...	...
Ethylene glycol monobutyl ether (EBGE)**	000111-76-2	...	2.1E-1	...	3.9E+4	...
Fluorene	000086-73-7	...	...	...	3.1E+3	...
Fluorine	007782-41-4	...	...	...	4.7E+3	...
Heptachlor	000076-44-8	...	...	1.9E-6	3.9E+1	1.4E-1
Heptachlor epoxide, alpha, beta, gamma	001024-57-3	...	...	9.4E-7	1.0E+0	7.0E-2
Heptachlorodibenzo-p-dioxin**	037871-00-4	...	...	...	...	...
Heptachlorodibenzo-p-dioxin 1,2,3,4,6,7,8-	035822-46-9	...	...	5.7E-8	...	4.3E-3

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

37

		AIR PATHWAY			SOIL PATHWAY	
Substance Name	CAS Number	NAAQS NESHAPS (ug/m^3)	Reference Dose Screen Conc (mg/m^3)	Cancer Risk Screen Conc (mg/m^3)	Reference Dose Screen Conc (mg/kg)	Cancer Risk Screen Conc (mg/kg)
Heptachlorodibenzofuran 1,2,3,4,6,7,8-	067562-39-4	...	...	5.7E-8	...	4.3E-3
Heptachlorodibenzofuran 1,2,3,4,7,8,9-	055673-89-7	...	...	5.7E-8*	...	4.3E-3*
Hexabromobiphenyl (PBB)**	036355-01-8	...	...	...	...	...
Hexachlorobenzene	000118-74-1	...	...	5.3E-6	6.3E+1	4.0E-1
Hexachlorobutadiene	000087-68-3	...	...	1.1E-4	1.6E+1	8.2E+0
Hexachlorocyclohexane, alpha-	000319-84-6	...	...	1.4E-6	...	1.0E-1
Hexachlorocyclohexane, beta-	000319-85-7	...	...	4.6E-6	...	3.5E-1
Hexachlorodibenzo-p-dioxin 1,2,3,4,7,8-	039227-28-6	...	...	1.4E-9	...	1.1E-4
Hexachlorodibenzo-p-dioxin 1,2,3,6,7,8-	057653-85-7	...	...	1.4E-9	...	1.1E-4
Hexachlorodibenzo-p-dioxin 1,2,3,7,8,9-	019408-74-3	...	...	1.9E-9	...	1.0E-4
Hexachlorodibenzofuran 1,2,3,4,7,8-	070648-26-9	...	...	5.7E-9	...	4.3E-4
Hexachlorodibenzofuran 1,2,3,6,7,8-	057117-44-9	...	...	5.7E-9	...	4.3E-4
Hexachlorodibenzofuran 1,2,3,7,8,9-	072918-21-9	...	...	5.7E-9	...	4.3E-4
Hexachlorodibenzofuran 2,3,4,6,7,8-	060851-34-5	...	...	5.7E-9	...	4.3E-4

38

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

HAZARD RANKING SYSTEM
Hazardous Substance Benchmarks

Substance Name	CAS Number	AIR PATHWAY NAAQS NESHAPS (ug/m^3)	AIR PATHWAY Reference Dose Screen Conc (mg/m^3)	AIR PATHWAY Cancer Risk Screen Conc (mg/m^3)	SOIL PATHWAY Reference Dose Screen Conc (mg/kg)	SOIL PATHWAY Cancer Risk Screen Conc (mg/kg)
Hydrazine	000302-01-2	...	...	5.0E-7	...	2.1E-1
Hydrogen sulfide	007783-06-4	...	2.1E-3	...	2.3E+3*	...
Indeno(1,2,3-cd)pyrene	000193-39-5	...	...	...	...	8.8E-1
Iron	007439-89-6	...	...	...	...	...
Lead	007439-92-1	1.5E+0	...	...	...	...
Lead chromate**	007758-97-6	...	...	...	...	...
Lindane	000058-89-9	...	...	...	2.3E+1	4.9E-1
Manganese	007439-96-5	...	5.2E-5	...	1.1E+4	...
Mercury	007439-97-6	...	3.1E-4	...	2.3E+1	...
Methoxychlor	000072-43-5	...	...	...	3.9E+2	...
Methyl Parathion	000298-00-0	...	...	...	2.0E+1	...
Methyl ethyl ketone	000078-93-3	...	5.2E+0*	...	4.7E+4*	...
Methyl isobutyl ketone	000108-10-1	...	3.1E+0*	...	6.3E+3	...
Methyl phenol, 4-	000106-44-5	...	...	...	3.9E+2	...
Methyl tert-butyl ether (MTBE)**	001634-04-4	...	3.1E+0	...	...	...

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

39

HAZARD RANKING SYSTEM
Hazardous Substance Benchmarks

		AIR PATHWAY			SOIL PATHWAY	
Substance Name	CAS Number	NAAQS NESHAPS (ug/m^3)	Reference Dose Screen Conc (mg/m^3)	Cancer Risk Screen Conc (mg/m^3)	Reference Dose Screen Conc (mg/kg)	Cancer Risk Screen Conc (mg/kg)
Methylene chloride (dichloromethane)	000075-09-2	...	3.1E+0	5.2E-3	4.7E+3	8.5E+1*
Methylnaphthalene, 2-	000091-57-6	...	...	...	...	...
Naphthalene	000091-20-3	...	3.1E-3*	...	3.1E+3	...
Nickel	007440-02-0	...	...	...	1.6E+3	...
Nitrosodiphenylamine, N-	000086-30-6	...	...	...	...	1.3E+2*
Pentachlorodibenzo-p-dioxin 1,2,3,7,8-	040321-76-4	...	...	1.1E-10	...	8.5E-6
Pentachlorodibenzofuran 1,2,3,7,8-	057117-41-6	...	...	...*	...	...*
Pentachlorodibenzofuran 2,3,4,7,8-**	057117-31-4	...	...	5.7E-10	...	4.3E-5
Pentachlorophenol (PCP)	000087-86-5	...	...	...	2.3E+3	5.3E+0
Perchlorate**	014797-73-0	...	...	...	7.8E+0	...
Phenanthrene	000085-01-8	...	...	...	...	...
Phenol	000108-95-2	...	...	...	2.3E+4*	...
Plutonium	007440-07-5	...	...	...	...	...
Polychlorinated biphenyls (PCBs)	001336-36-3	...	...	2.4E-5*	1.6E+0	3.2E-1*

40

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

		AIR PATHWAY			SOIL PATHWAY	
Substance Name	CAS Number	NAAQS NESHAPS (ug/m^3)	Reference Dose Screen Conc (mg/m^3)	Cancer Risk Screen Conc (mg/m^3)	Reference Dose Screen Conc (mg/kg)	Cancer Risk Screen Conc (mg/kg)
Pyrene	000129-00-0	...	...	...	2.3E+3	...
Radium	007440-14-4	...	...	...	...	...
Radon	010043-92-2	...	...	...	...	...
Selenium	007782-49-2	...	...	...	3.9E+2	...
Silver	007440-22-4	...	...	...	3.9E+2	...
Strontium	007440-24-6	...	...	...	4.7E+4*	...
Styrene	000100-42-5	...	1.0E+0	...	1.6E+4*	...
Tetrachlorobenzene, 1,2,4,5-	000095-94-3	...	...	...	2.3E+1	...
Tetrachlorodibenzo-p-dioxin**	041903-57-5	...	...	...	...	...
Tetrachlorodibenzo-p-dioxin 2,3,7,8- (TCDD)	001746-01-6	...	...	5.7E-11	...	4.3E-6
Tetrachlorodibenzofuran 2,3,7,8-	051207-31-9	...	...	5.7E-10	...	4.3E-5
Tetrachloroethane, 1,1,2,2-	000079-34-5	...	...	4.2E-5	...	3.2E+0
Tetrachloroethylene	000127-18-4	...	...	...	7.8E+2	1.2E+1
Thallium	007440-28-0	...	...	...	...	...
Toluene	000108-88-3	...	4.2E-1	...	1.6E+4*	...

(47)

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

Substance Name	CAS Number	AIR PATHWAY NAAQS NESHAPS (ug/m^3)	AIR PATHWAY Reference Dose Screen Conc (mg/m^3)	AIR PATHWAY Cancer Risk Screen Conc (mg/m^3)	SOIL PATHWAY Reference Dose Screen Conc (mg/kg)	SOIL PATHWAY Cancer Risk Screen Conc (mg/kg)
Toxaphene	008001-35-2	...	...	7.6E-6	...	5.8E-1
Trichlorobenzene, 1,2,4-	000120-82-1	...	2.1E-1	...	7.8E+2	...
Trichloroethane, 1,1,1-	000071-55-6	...	2.3E+0*	...	...	...
Trichloroethane, 1,1,2-	000079-00-5	...	...	1.5E-4	3.1E+2	1.1E+1
Trichloroethylene (TCE)	000079-01-6	...	...	...	...	5.8E+1*
Trichlorofluoromethane	000075-69-4	...	7.3E-1	...	2.3E+4*	...
Trichlorophenol, 2,4,6-	000088-06-2	...	...	7.8E-4	...	5.8E+1*
Trichloropropane, 1,2,3-	000096-18-4	...	...	...	4.7E+2	9.1E-2
Trifluralin (Treflan)	001582-09-8	...	...	...	5.9E+2	8.3E+1*
Trinitrobenzene, 1,3,5-	000099-35-4	...	...	...	2.3E+3*	...
Vanadium	007440-62-2	...	...	...	5.5E+2	...
Vinyl acetate	000108-05-4	...	2.1E-1	...	7.8E+4*	...
Vinyl chloride	000075-01-4	...	1.0E-1*	2.8E-4	2.3E+2*	4.3E-1*
Xylene**	001330-20-7	...	1.0E-1	...	1.6E+4	...

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

Substance Name	CAS Number	AIR PATHWAY NAAQS NESHAPS (ug/m^3)	AIR PATHWAY Reference Dose Screen Conc (mg/m^3)	AIR PATHWAY Cancer Risk Screen Conc (mg/m^3)	SOIL PATHWAY Reference Dose Screen Conc (mg/kg)	SOIL PATHWAY Cancer Risk Screen Conc (mg/kg)
Xylene, m-	000108-38-3	...	...	...	1.6E+5*	...
Xylene, o-	000095-47-6	...	...	...	1.6E+5*	...
Xylene, p-	000106-42-3	...	...	...	...	...
Zinc	007440-66-6	...	...	...	2.3E+4*	...

(43)

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

Substance Name	CAS Number	DRINKING WATER MCL (pCi/L)	DRINKING WATER Cancer Risk Screen Conc (pCi/L)	FOOD CHAIN Cancer Risk Screen Conc (pCi/kg)	AIR Cancer Risk Screen Conc (pCi/m3)	SOIL UMTRCA (pCi/kg)	SOIL Cancer Risk Soil Ing (pCi/kg)	SOIL Cancer Risk Soil Gam (pCi/kg)
Americium 241	014596-10-2	1.5E+1*	4.6E-1*	1.3E+1*	1.7E-4*	...	3.7E+3*	...
Antimony 125(+D) (radionuclide)	014234-35-6	3.0E+2*	9.3E+0*	2.4E+2*	2.5E-1*	...	6.0E+4*	...
Cadmium 109 (radionuclide)	014109-32-1	6.0E+2*	9.5E+0*	2.6E+2*	2.2E-1*	...	7.0E+4*	...
Cesium 137(+D) (radionuclide)	010045-97-3	2.0E+2*	1.6E+0*	4.7E+1*	4.0E-1*	...	1.8E+4*	...
Cobalt 57 (radionuclide)	013981-50-5	1.0E+3*	4.6E+1*	1.2E+3*	2.3E+0*	...	2.9E+5*	...
Cobalt 60 (radionuclide)	010198-40-0	1.0E+2*	3.0E+0*	7.9E+1*	1.3E-1*	...	2.0E+4*	...
Iron 55 (radionuclide)	014681-59-5	2.0E+3*	5.5E+1*	1.5E+3*	6.0E+0*	...	3.8E+5*	...
Lead 210(+D) (radionuclide)	014255-04-0	...	3.7E-2	5.1E-1*	3.4E-4	...	3.0E+2*	...
Manganese 54 (radionuclide)	013966-31-9	3.0E+2*	2.1E+1*	5.7E+2*	8.1E-1*	...	1.5E+5*	...
Nickel 59 (radionuclide)	014336-70-0	3.0E+2*	1.8E+2*	4.5E+3*	1.0E+1*	...	1.1E+6*	...
Nickel 63 (radionuclide)	013981-37-8	5.0E+1*	7.1E+1*	1.9E+3*	2.9E+0*	...	4.4E+5*	...
Plutonium 236 (radionuclide)	015411-92-4	...	6.4E-1	1.8E+1*	2.1E-4*	...	4.6E+3*	...
Plutonium 238 (radionuclide)	013981-16-3	1.5E+1*	3.6E-1*	1.0E+1*	1.4E-4*	...	2.9E+3*	...
Plutonium 239 (radionuclide)	015117-48-3	1.5E+1*	3.5E-1*	1.0E+1*	1.4E-4*	...	2.9E+3*	...
Plutonium 240 (radionuclide)	014119-33-6	1.5E+1*	3.5E-1*	1.0E+1*	1.4E-4*	...	2.9E+3*	...

44

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

Substance Name	CAS Number	DRINKING WATER MCL (pCi/L)	DRINKING WATER Cancer Risk Screen Conc (pCi/L)	FOOD CHAIN Cancer Risk Screen Conc (pCi/kg)	AIR Cancer Risk Screen Conc (pCi/m3)	SOIL UMTRCA (pCi/kg)	SOIL Cancer Risk Soil Ing (pCi/kg)	SOIL Cancer Risk Soil Gam (pCi/kg)
Plutonium 241(+D) (radionuclide)	014119-32-5	...	2.7E+1*	7.7E+2*	1.4E-2*	...	2.4E+5*	...
Plutonium 242 (radionuclide)	013982-10-0	1.5E+1*	3.7E-1*	1.1E+1*	1.5E-4*	...	3.0E+3*	...
Plutonium 243 (radionuclide)	015706-37-3	...	1.0E+2*	2.5E+3*	1.6E+1*	...	5.9E+5*	...
Plutonium 244(+D) (radionuclide)	014119-34-7	1.5E+1*	3.5E-1*	9.8E+0*	1.6E-4*	...	2.7E+3*	...
Radium 226(+D) (radionuclide)	013982-63-3	5.0E+0*	1.2E-1	3.4E+0*	4.1E-4	...	1.1E+3*	...
Radium 228(+D) (radionuclide)	015262-20-1	5.0E+0*	4.6E-2*	1.2E+0*	9.1E-4*	...	3.5E+2*	...
Radon 222 (+D)(radionuclide)	014859-67-7	...	...	...	6.3E-1	...	...	...
Silver 108m(+D) (radionuclide)	014391-65-2	...	5.8E+0*	1.6E+2*	1.8E-1*	...	4.1E+4*	...
Silver 110m (radionuclide)	014391-76-5	9.0E+1*	4.8E+0*	1.3E+2*	1.7E-1*	...	3.4E+4*	...
Strontium 90(+D) (radionuclide)	010098-97-2	8.0E+0*	6.4E-1*	1.8E+1*	4.2E-2*	...	5.5E+3*	...
Technetium 99 (radionuclide)**	014133-76-7	9.0E+2	1.7E+1	4.4E+2	3.4E-1*	...	1.0E+5	...
Thallium 204 (radionuclide)	013968-51-9	3.0E+2*	8.1E+0*	2.1E+2*	1.9E+0*	...	5.2E+4*	...
Thorium 227 (radionuclide)	015623-47-9	...	1.0E+0*	2.5E+1*	1.4E-4*	...	5.8E+3*	...
Thorium 228(+D) (radionuclide)	014274-82-9	1.5E+1*	1.6E-1	4.2E+0*	3.3E-5*	...	9.8E+2*	...

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

HAZARD RANKING SYSTEM
Hazardous Substance Benchmarks

Substance Name	CAS Number	DRINKING WATER		FOOD CHAIN	AIR	SOIL		
		MCL (pCi/L)	Cancer Risk Screen Conc (pCi/L)	Cancer Risk Screen Conc (pCi/kg)	Cancer Risk Screen Conc (pCi/m3)	UMTRCA (pCi/kg)	Cancer Risk Soil Ing (pCi/kg)	Cancer Risk Soil Gam (pCi/kg)
Thorium 229(+D) (radionuclide)	015594-54-4	1.5E+1*	9.0E-2	2.5E+0*	2.1E-5*	...	6.2E+2*	...
Thorium 230 (radionuclide)	014269-63-7	1.5E+1*	5.2E-1*	1.5E+1*	1.7E-4*	...	3.9E+3*	...
Thorium 231 (radionuclide)	014932-40-2	...	2.2E+1*	5.4E+2*	3.1E+0*	...	1.2E+5*	...
Thorium 232 (radionuclide)	007440-29-1	1.5E+1*	4.7E-1*	1.3E+1*	1.1E-4*	...	3.4E+3*	...
Thorium 234 (radionuclide)	015065-10-8	...	2.1E+0*	5.8E+1*	1.6E-1*	...	1.2E+4*	...
Tritium	010028-17-8	...	4.3E+2*	1.2E+4*	2.4E+1*	...	3.6E+6*	...
Uranium 232 (radionuclide)	014158-29-3	2.0E+1*	1.6E-1*	4.6E+0*	2.4E-4*	...	1.4E+3*	...
Uranium 233 (radionuclide)	013968-55-3	2.0E+1*	6.6E-1*	1.8E+1*	4.1E-4*	...	5.0E+3*	...
Uranium 234 (radionuclide)	013966-29-5	2.0E+1*	6.7E-1*	1.8E+1*	4.2E-4*	...	5.0E+3*	...
Uranium 235(+D) (radionuclide)	015117-96-1	2.0E+1*	6.6E-1*	1.8E+1*	4.7E-4*	...	4.9E+3*	...
Uranium 236(+D) (radionuclide)	013982-70-2	2.0E+1*	7.1E-1*	1.9E+1*	4.5E-4*	...	5.3E+3*	...
Uranium 238(+D) (radionuclide)	007440-61-1	2.0E+1*	5.5E-1*	1.5E+1*	5.1E-4*	...	3.8E+3*	...
Zinc 65 (radionuclide)	013982-39-3	3.0E+2*	4.1E+0*	1.1E+2*	8.2E-1*	...	3.2E+4*	...

46

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

Footnote Code	Footnote Description
A	This recommended water quality criterion was derived from data for arsenic (III), but is applied here to total arsenic, which might imply that arsenic (III) and arsenic (V) are equally toxic to aquatic life and that their toxicities are additive. In the arsenic criteria document (EPA 440/5-84-033, January 1985), Species Mean Acute Values are given for both arsenic (III) and arsenic (V) for five species and the ratios of the SMAVs for each species range from 0.6 to 1.7. Chronic values are available for both arsenic (III) and arsenic (V) for one species; for the fathead minnow, the chronic value for arsenic (V) is 0.29 times the chronic value for arsenic (III). No data are known to be available concerning whether the toxicities of the forms of arsenic to aquatic organisms are additive.
B	This criterion has been revised to reflect The Environmental Protection Agency's q1* or RfD, as contained in the Integrated Risk Information System (IRIS) as of May 17, 2002. The fish tissue bioconcentration factor (BCF) from the 1980 Ambient Water Quality Criteria document was retained in each case.
C	This criterion is based on carcinogenicity of 10^{-6} risk. Alternate risk levels may be obtained by moving the decimal point (e.g., for a risk level of 10^{-5}, move the decimal point in the recommended criterion one place to the right).
D	Freshwater and saltwater criteria for metals are expressed in terms of the dissolved metal in the water column. The recommended water quality criteria value was calculated by using the previous 304(a) aquatic life criteria expressed in terms of total recoverable metal, and multiplying it by a conversion factor (CF). The term "Conversion Factor" (CF) represents the recommended conversion factor for converting a metal criterion expressed as the total recoverable fraction in the water column to a criterion expressed as the dissolved fraction in the water column. (Conversion Factors for saltwater CCCs are not currently available. Conversion factors derived for saltwater CMCs have been used for both saltwater CMCs and CCCs). See "Office of Water Policy and Technical Guidance on Interpretation and Implementation of Aquatic Life Metals Criteria," October 1, 1993, by Martha G. Prothro, Acting Assistant Administrator for Water, available from the Water Resource center, USEPA, 401 M St., SW, mail code RC4100, Washington, DC 20460; and 40CFR§131.36(b)(1). Conversion Factors applied in the table can be found in Appendix A to the Preamble- Conversion Factors for Dissolved Metals (which is attached below).
E	The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. The value given here corresponds to a hardness of 100 mg/L. Criteria values for other hardness may be calculated from the following: CMC (dissolved) = $\exp\{m_A [\ln(\text{hardness})] + b_A\}$ (CF), or CCC (dissolved) = $\exp\{m_C [\ln(\text{hardness})] + b_C\}$ (CF) and the parameters specified in Appendix B- Parameters for Calculating Freshwater Dissolved Metals Criteria That Are Hardness-Dependent (which is attached below).
F	Freshwater aquatic life values for pentachlorophenol are expressed as a function of pH, and are calculated as follows: CMC = exp(1.005(pH)-4.869); CCC = exp(1.005(pH)-5.134). Values displayed in table correspond to a pH of 7.8.
G	This Criterion is based on 304(a) aquatic life criterion issued in 1980, and was issued in one of the following documents: Aldrin/Dieldrin (EPA 440/5-80-019), Chlordane (EPA 440/5-80-027), DDT (EPA 440/5-80-038), Endosulfan (EPA 440/5-80-046), Endrin (EPA 440/5-80-047), Heptachlor (EPA 440/5- 80-052), Hexachlorocyclohexane (EPA 440/5-80-054), Silver (EPA 440/5-80-071). The Minimum Data Requirements and derivation procedures were different in the 1980 Guidelines than in the 1985 Guidelines. For example, a "CMC" derived using the 1980 Guidelines was derived to be used as an instantaneous maximum. If assessment is to be done using an averaging period, the values given should be divided by 2 to obtain a value that is more comparable to a CMC derived using the 1985 Guidelines.
H	No criterion for protection of human health from consumption of aquatic organisms excluding water was presented in the 1980 criteria document or in the *1986 Quality Criteria for Water*. Nevertheless, sufficient information was presented in the 1980 document to allow the calculation of a criterion, even though the results of such a calculation were not shown in the document.
I	This criterion for asbestos is the Maximum Contaminant Level (MCL) developed under the Safe Drinking Water Act (SDWA).
J	This fish tissue residue criterion for methylmercury is based on a total fish consumption rate of 0.0175 kg/day.

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

Footnote Code	Footnote Description
K	This recommended criterion is based on a 304(a) aquatic life criterion that was issued in the *1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water*, (EPA-820-B-96-001, September 1996). This value was derived using the GLI Guidelines (60FR15393-15399, March 23, 1995; 40CFR132 Appendix A); the difference between the 1985 Guidelines and the GLI Guidelines are explained on page iv of the 1995 Updates. None of the decisions concerning the derivation of this criterion were affected by any considerations that are specific to the Great Lakes.
L	The CMC = 1/[(f1/CMC1) + (f2/CMC2)] where f1 and f2 are the fractions of total selenium that are treated as selenite and selenate, respectively, and CMC1 and CMC2 are 185.9 µg/l and 12.82 µg/l, respectively.
M	EPA is currently reassessing the criteria for arsenic.
N	This criterion applies to total pcbs, (e.g., the sum of all congener or all isomer or homolog or Aroclor analyses.)
O	The derivation of the CCC for this pollutant (Endrin) did not consider exposure through the diet, which is probably important for aquatic life occupying upper trophic levels.
P	Although a new RfD is available in IRIS, the surface water criteria will not be revised until the National Primary Drinking Water Regulations: Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 DBPR) is completed, since public comment on the relative source contribution (RSC) for chloroform is anticipated.
Q	This recommended water quality criterion is expressed as µg free cyanide (as CN)/L.
R	This value for selenium was announced (61FR58444-58449, November 14, 1996) as a proposed GLI 303(c) aquatic life criterion. EPA is currently working on this criterion and so this value might change substantially in the near future.
S	This recommended water quality criterion for arsenic refers to the inorganic form only.
T	This recommended water quality criterion for selenium is expressed in terms of total recoverable metal in the water column. It is scientifically acceptable to use the conversion factor (0.996- CMC or 0.922- CCC) that was used in the GLI to convert this to a value that is expressed in terms of dissolved metal.
U	The organoleptic effect criterion is more stringent than the value for priority toxic pollutants.
V	This value was derived from data for heptachlor and the criteria document provides insufficient data to estimate the relative toxicities of heptachlor and heptachlor epoxide.
W	Although EPA has not published a completed criteria document for butylbenzyl phthalate it is EPA's understanding that sufficient data exist to allow calculation of aquatic criteria. It is anticipated that industry intends to publish in the peer reviewed literature draft aquatic life criteria generated in accordance with EPA Guidelines. EPA will review such criteria for possible issuance as national WQC.
X	There is a full set of aquatic life toxicity data that show that DEHP is not toxic to aquatic organisms at or below its solubility limit.
Y	This value was derived from data for endosulfan and is most appropriately applied to the sum of alpha-endosulfan and beta-endosulfan.
Z	A more stringent MCL has been issued by EPA. Refer to drinking water regulations (40 CFR 141) or Safe Drinking Water Hotline (1-800-426-4791) for values.
aa	This criterion is based on a 304(a) aquatic life criterion issued in 1980 or 1986, and was issued in one of the following documents: Aldrin/Dieldrin (EPA 440/5-80-019), Chlordane (EPA 440/5-80-027), DDT (EPA 440/5-80- 038), Endrin (EPA 440/5-80-047), Heptachlor (EPA 440/5-80-052), Polychlorinated biphenyls (EPA 440/5-80-068), Toxaphene (EPA 440/5-86-006). This CCC is currently based on the Final Residue Value (FRV) procedure. Since the publication of the Great Lakes Aquatic Life Criteria Guidelines in 1995 (60FR15393-15399, March 23, 1995), the Agency no longer uses the Final Residue Value procedure for deriving CCCs for new or revised 304(a) aquatic life criteria. Therefore, the Agency anticipates that future revisions of this CCC will not be based on the FRV procedure.

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

458

Footnote Code	Footnote Description
bb	This water quality criterion is based on a 304(a) aquatic life criterion that was derived using the 1985 Guidelines (*Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses*, PB85-227049, January 1985) and was issued in one of the following criteria documents: Arsenic (EPA 440/5-84-033), Cadmium (EPA 882-R-01-001), Chromium (EPA 440/5-84-029), Copper (EPA 440/5-84-031), Cyanide (EPA 440/5- 84-028), Lead (EPA 440/5-84-027), Nickel (EPA 440/5-86-004), Pentachlorophenol (EPA 440/5-86-009), Toxaphene, (EPA 440/5-86-006), Zinc (EPA 440/5-87- 003).
cc	When the concentration of dissolved organic carbon is elevated, copper is substantially less toxic and use of Water-Effect Ratios might be appropriate.
dd	The selenium criteria document (EPA 440/5-87-006, September 1987) provides that if selenium is as toxic to saltwater fishes in the field as it is to freshwater fishes in the field, the status of the fish community should be monitored whenever the concentration of selenium exceeds 5.0 µg/L in salt water because the saltwater CCC does not take into account uptake via the food chain.
ee	This recommended water quality criterion was derived on page 43 of the mercury criteria document (EPA 440/5- 84-026, January 1985). The saltwater CCC of 0.025 ug/L given on page 23 of the criteria document is based on the Final Residue Value procedure in the 1985 Guidelines. Since the publication of the Great Lakes Aquatic Life Criteria Guidelines in 1995 (60FR15393-15399, March 23, 1995), the Agency no longer uses the Final Residue Value procedure for deriving CCCs for new or revised 304(a) aquatic life criteria.
ff	This recommended water quality criterion was derived in *Ambient Water Quality Criteria Saltwater Copper Addendum* (Draft, April 14, 1995) and was promulgated in the Interim final National Toxics Rule (60FR22228- 222237, May 4, 1995).
gg	EPA is actively working on this criterion and so this recommended water quality criterion may change substantially in the near future.
hh	This recommended water quality criterion was derived from data for inorganic mercury (II), but is applied here to total mercury. If a substantial portion of the mercury in the water column is methylmercury, this criterion will probably be under protective. In addition, even though inorganic mercury is converted to methylmercury and methylmercury bioaccumulates to a great extent, this criterion does not account for uptake via the food chain because sufficient data were not available when the criterion was derived.
ii	This criterion applies to DDT and its metabolites (i.e., the total concentration of DDT and its metabolites should not exceed this value).
F2	The derivation of this value is presented in the Red Book (EPA 440/9-76-023, July, 1976).
G2	This value is based on a 304(a) aquatic life criterion that was derived using the 1985 Guidelines (*Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses*, PB85-227049, January 1985) and was issued in one of the following criteria documents: Aluminum (EPA 440/5-86-008); Chloride (EPA 440/5-88-001); Chloropyrifos (EPA 440/5-86-005).
I2	This value for aluminum is expressed in terms of total recoverable metal in the water column.
L2	There are three major reasons why the use of Water-Effect Ratios might be appropriate. (1) The value of 87 µg/l is based on a toxicity test with the striped bass in water with pH= 6.5-6.6 and hardness <10 mg/L. Data in "Aluminum Water-Effect Ratio for the 3M Plant Effluent Discharge, Middleway, West Virginia" (May 1994) indicate that aluminum is substantially less toxic at higher pH and hardness, but the effects of pH and hardness are not well quantified at this time. (2) In tests with the brook trout at low pH and hardness, effects increased with increasing concentrations of total aluminum even though the concentration of dissolved aluminum was constant, indicating that total recoverable is a more appropriate measurement than dissolved, at least when particulate aluminum is primarily aluminum hydroxide particles. In surface waters, however, the total recoverable procedure might measure aluminum associated with clay particles, which might be less toxic than aluminum associated with aluminum hydroxide. (3) EPA is aware of field data indicating that many high quality waters in the U.S. contain more than 87 µg aluminum/L, when either total recoverable or dissolved is measured.

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

Conversion Factors for Dissolved Metals				
Metal	Conversion Factor Freshwater CMC	Conversion Factor Freshwater CCC	Conversion Factor Saltwater CMC	Conversion Factor Saltwater CMC
Arsenic	1.000	1.000	1.000	1.000
Cadmium	1.136672-[(ln hardness)(0.041838)]	1.101672-[(ln hardness)(0.041838)]	0.994	0.994
ChromiumIII	0.316	0.860	--	--
Chromium VI	0.982	0.962	0.993	0.993
Copper	0.960	0.960	0.83	0.83
Lead	1.46203-[(ln hardness)(0.145712)]	1.46203-[ln hardness)(0.145712)]	0.951	0.951
Mercury	0.85	0.85	0.85	0.85
Nickel	0.998	0.997	0.990	0.990
Selenium	--	--	0.998	0.998
Silver	0.85	--	0.85	--
Zinc	0.978	0.986	0.946	0.946

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

50

15

Parameters for Calculating Freshwater Dissolved Metals That are Hardness Dependent						
					Conversion Factors (CF)	
Chemical	**m_A**	**b_A**	**m_C**	**b_C**	**CMC**	**CCC**
Cadmium	1.0166	-3.924	0.7409	-4.719	1.136672-[(ln hardness)(0.041838)]	1.101672-[(ln hardness)(0.041838)]
Chromium III	0.8190	3.7256	0.8190	0.6848	0.316	0.860
Copper	0.9422	-1.700	0.8545	-1.702	0.960	0.960
Lead	1.273	-1.460	1.273	-4.705	1.46203-[(ln hardness)(0.145712)]	1.46203-[(ln hardness)(0.145712)]
Nickel	0.8460	2.255	0.8460	0.0584	0.998	0.997
Silver	1.72	-6.59	--	--	0.85	--
Zinc	0.8473	0.884	0.8473	0.884	0.978	0.986

Hardness-dependent metals' criteria may be calculated from the following:

CMC (dissolved) = exp {m_A [ln(hardness)] + b_A} (CF)
CCC (dissolved) = exp {m_C [ln(hardness)] + b_C} (CF)

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data (JAN04).
** Indicates new hazardous substance in current version of chemical data (JAN04).

CAS Number	Chemical Name	Synonyms
000083-32-9	Acenaphthene	Acenaphthylene, 1,2-dihydro
000067-64-1	Acetone	2-Propanone
000107-02-8	Acrolein	Propenal
000079-06-1	Acrylamide	Propenamide
000062-53-3	Aniline	Benzeneamine
000120-12-7	Anthracene	Paranaphthalene
000056-55-3	Benz(a)anthracene	Benzanthrene
000071-43-2	Benzene	Coal naptha
000092-87-5	Benzidine	(1,1'-biphenyl)-4,4'-diamine
000050-32-8	Benzo(a)pyrene	Benz(a)pyrene
000206-44-0	Benzo(j,k)fluorene (Fluoranthene)	Fluoranthene
000207-08-9	Benzo(k)fluoranthene	Dibenzo(b,j,k)fluorene
000117-81-7	Bis (2-ethylhexyl) phthalate	Benzenedicarboxylic acid, bis (2-ethylhexyl) ester, 1,2-
000075-27-4	Bromodichloromethane	Dichlorobromomethane
000085-68-7	Butylbenzyl phthalate	1,2-benzenedicarboxylic acid, butyl phenylmethyl ester
000075-15-0	Carbon disulfide	Dithiocarbonic anhydride
000056-23-5	Carbon tetrachloride	Tetrachloromethane
000057-74-9	Chlordane	Octachloro-4,7-methanotetrahydroindane
005103-71-9	Chlordane, alpha-	cis-Chlordane
005566-34-7	Chlordane, gama-	trans-Chlordane
000108-90-7	Chlorobenzene	Phenyl chloride
000067-66-3	Chloroform	Trichloromethane
007440-47-3	Chromium	Chrome
000218-01-9	Chrysene	Benzophenanthrene, 1,2-
000098-82-8	Cumene	Methylethylbenzene, 1-
000057-12-5	Cyanide	Hydrocyanic acid
000072-54-8	DDD	Dichlorodiphenyl dichloroethane
000072-55-9	DDE	Dichlorodiphenyldichloroethylene, p,p-
000050-29-3	DDT	Dichlorodiphenyltrichloroethane, 4,4-
000084-74-2	Di-n-butyl phthalate	Benzenedicarboxylic acid, dibutyl ester, 1,2-
000117-84-0	Di-n-octyl phthalate	Benzenedicarboxylic acid, dioctyl ester, 1,2-
000053-70-3	Dibenz(a,h)anthracene	Dibenz(a)anthracene, 1,2:5,6-
000132-64-9	Dibenzofuran	Diphenylene Oxide
000096-12-8	Dibromo-3-chloropropane, 1,2-	Nemazon
000106-93-4	Dibromoethane, 1,2-	Ethylene dibromide (EDB)
000106-46-7	Dichlorobenzene, 1,4-	Chlorophenyl chloride, p-
000075-34-3	Dichloroethane, 1,1-	Ethylidene chloride
000107-06-2	Dichloroethane, 1,2-	Ethylene chloride

CAS Number	Chemical Name	Synonyms
000075-35-4	Dichloroethylene, 1,1-	Dichloroethylene, 1,1-
000156-59-2	Dichloroethylene, cis-1,2-	cis-dichloroethylene
000156-60-5	Dichloroethylene, trans-1,2-	1,2-dichloroethylene
000120-83-2	Dichlorophenol, 2,4-	Dichlorophenol, 4,6-
000078-87-5	Dichloropropane, 1,2-	Propylene chloride
000542-75-6	Dichloropropene, 1,3-	Dichloropropylene, 1,3-
000060-57-1	Dieldrin	Aldrin epoxide
000084-66-2	Diethyl phthalate	Benzenedicarboxylic acid, didecyl ester, 1,2-
000105-67-9	Dimethyl phenol, 2,4-	1-Hydroxy-2,4-dimethylbenzene
000099-65-0	Dinitrobenzene, 1,3-	Dinitrobenzene, 1,2-
000122-66-7	Diphenylhydrazine, 1,2-	Hydrazodibenzene
000100-41-4	Ethyl benzene	Phenylethane
000075-00-3	Ethyl chloride	Chloroethane
000086-73-7	Fluorene	Methylenebiphenyl, 2,2-
007782-41-4	Fluorine	Fluorine-19
000076-44-8	Heptachlor	Chlorochlordene, 3-
001024-57-3	Heptachlor epoxide, alpha, beta, gamma	Epoxyheptachlor
000118-74-1	Hexachlorobenzene	Perchlorobenzene
000087-68-3	Hexachlorobutadiene	Perchlorobutadiene
000319-84-6	Hexachlorocyclohexane, alpha-	alpha-BHC
000319-85-7	Hexachlorocyclohexane, beta-	beta-BHC
000302-01-2	Hydrazine	Diamine
007783-06-4	Hydrogen sulfide	Hydrosulfuric acid
000058-89-9	Lindane	Hexachlorocyclohexane- gamma
000072-43-5	Methoxychlor	(2,2,2-trichloroethylidiene)bis(4-methoxy-benzene), 1,1'-
000298-00-0	Methyl Parathion	Dimethyl p-nitrophenyl thiophosphate
000078-93-3	Methyl ethyl ketone	Butanone
000108-10-1	Methyl isobutyl ketone	Methyl-2-pentanone, 4-
000106-44-5	Methyl phenol, 4-	Methyl phenol, 4-
000075-09-2	Methylene chloride (dichloromethane)	Dichloromethane
000091-57-6	Methylnaphthalene, 2-	Methylnaphthalene, 2-
000091-20-3	Naphthalene	Tar camphor
000086-30-6	Nitrosodiphenylamine, N-	Diphenylnitrosamine : Nitrosophenylbenzeneamine, –
000085-01-8	Phenanthrene	Phenanthren
000108-95-2	Phenol	Phenyl alcohol
001336-36-3	Polychlorinated biphenyls (PCBs)	Polychlorinated biphenyls
000129-00-0	Pyrene	Benzo(def)phenanthrene

CAS Number	Chemical Name	Synonyms
000100-42-5	Styrene	Vinylbenzene
000095-94-3	Tetrachlorobenzene, 1,2,4,5-	Tetrachlorobenzene, s-
001746-01-6	Tetrachlorodibenzo-p-dioxin 2,3,7,8- (TCDD)	2,3,7,8-Tetrachlorodibenzo-p-dioxin : Tetrachlorodibenzo-p-dioxin, 2,3,7,8-
000079-34-5	Tetrachloroethane, 1,1,2,2-	Acetylene tetrachloride
000127-18-4	Tetrachloroethylene	Tetrachloroethylene
007440-29-1	Thorium 232 (radionuclide)	Thorium 232
000108-88-3	Toluene	Methyl benzene
008001-35-2	Toxaphene	Chlorinated camphene
000071-55-6	Trichloroethane, 1,1,1-	Methyl chloroform
000079-00-5	Trichloroethane, 1,1,2-	Vinyl trichloride
000079-01-6	Trichloroethylene (TCE)	Trichloroethene
000075-69-4	Trichlorofluoromethane	Freon 11
001582-09-8	Trifluralin (Treflan)	Treflan
007440-61-1	Uranium 238(+D) (radionuclide)	Uranium 238
000108-05-4	Vinyl acetate	Acetic acid, vinyl ester
000075-01-4	Vinyl chloride	Chloroethene
000108-38-3	Xylene, m-	Dimethyl benzene, 1,3-
000095-47-6	Xylene, o-	Methyltoulene, o-
000106-42-3	Xylene, p-	Dimethylbenzene, 1,4-

SUPERFUND CHEMICAL DATA MATRIX

Date: 3/24/2004
Chemical: Trichloroethylene (TCE)
CAS Number: 000079-01-6

TOXICITY

Parameter	Value	Unit	Source
Oral RfD:	3.0E-4	mg/kg/day	LIVECHEM
Inhal RfD:		mg/kg/day	
Oral Slope:	4.0E-1	(mg/kg/day)^-1	LIVECHEM
Oral Wt-of-Evid:	B2		
Inhal Slope:		(mg/kg/day)^-1	
Inhal Wt-of-Evid:			
Oral ED10:	1.0E+1	mg/kg/day	EPA_ED10
Oral ED10 Wgt:	B2		
Inhal ED10:	1.0E+1	mg/kg/day	EPA_ED10
Inhal ED10 Wgt:	B2		
Oral LD50:	6.0E+3	mg/kg	ACGIH
Dermal LD50:	2.0E+4	mg/kg	RTECS
Gas Inhal LC50:	4.8E+3	ppm	RTECS
Dust Inhal LC50:	3.3E+1	mg/L	RTECS
ACUTE			
Fresh CMC:		µg/L	
Salt CMC:		µg/L	
CHRONIC			
Fresh CCC:		µg/L	
Salt CCC:		µg/L	
Fresh Ecol LC50:	1.9E+3	µg/L	ECOTOX
Salt Ecol LC50:	1.2E+4	µg/L	ECOTOX

PERSISTENCE

Parameter	Value	Unit	Source
LAKE - Halflives			
Hydrolysis:	3.2E+2	days	FATERATE
Volatility:	1.0E+2	days	THOMAS
Photolysis:		days	
Biodeg:	3.6E+2	days	FATERATE
Radio:		days	
RIVER - Halflives			
Hydrolysis:	3.2E+2	days	FATERATE
Volatility:	1.1E+0	days	THOMAS
Photolysis:		days	
Biodeg:	3.6E+2	days	FATERATE
Radio:		days	
Log Kow:	2.4E+0		CHEMFATE

PHYSICAL CHARACTERISTICS

Parameter	Value		
Metal Contain:	No		
Organic:	Yes		
Gas:	Yes		
Particulate:	No		
Radionuclide:	No		
Rad. Element:	No		
Molecular Weight:	1.3E+2		
Density:	1.5E+0	g/mL @ 20.00	C

MOBILITY

Parameter	Value	Unit	Source
Vapor Press:	7.3E+1	Torr	CHEMFATE
Henry's Law:	1.0E-2	atm-m3/mol	CHEMFATE
Water Solub:	1.5E+3	mg/L	CHEMFATE
Distrib Coef:	3.3E-1	ml/g	SSG_KD
Geo Mean Sol:		mg/L	

BIOACCUMULATION

Parameter	Value	Unit	Source
FOOD CHAIN			
Fresh BCF:	1.7E+1		ECOTOX
Salt BCF:			
ENVIRONMENTAL			
Fresh BCF:	1.7E+1		ECOTOX
Salt BCF:			
Log Kow:	2.4E+0		CHEMFATE
Water Solub:	1.5E+3		CHEMFATE
Geo Mean Sol:		mg/L	

OTHER DATA

Melting Point:	-8.5E+1	C
Boiling Point:	8.7E+1	C
Formula:	C2 H Cl3	

CLASS INFORMATION

Class	Parent Substance

AT

SUPERFUND CHEMICAL DATA MATRIX

Date: 3/24/2004

Chemical: Trichloroethylene (TCE)

CAS Number: 000079-01-6

ASSIGNED FACTOR VALUES

AIR PATHWAY

Parameter	Value
Toxicity:	10000
Gas Mobility:	1.0000
Gas Migration:	17

GROUND WATER PATHWAY

Parameter		Value
Toxicity:		10000
Water Solub:		1.5E+3
Distrib:		3.3E-1
Geo Mean Sol:		
Mobility:		
Liquid	Karst:	1.0E+0
	Non Karst:	1.0E+0
Non Liq.	Karst:	1.0E+0
	Non Karst:	1.0E+0

SOIL EXPOSURE PATHWAY

Parameter	Value
Toxicity:	10000

SURFACE WATER PATHWAY

DRINKING WATER

Parameter	Value
Toxicity:	10000
Persistence	
River:	0.4000
Lake:	1.0000

HUMAN FOOD CHAIN

Parameter	Value
Toxicity:	10000
Persistence	
River:	0.4000
Lake:	1.0000
Bioaccumulation	
Fresh:	50.0
Salt:	50.0

ENVIRONMENTAL

Parameter	Value
Fresh Tox:	100
Salt Tox:	10
Persistence	
River:	0.4000
Lake:	1.0000
Bioaccumulation	
Fresh:	50.0
Salt:	50.0

BENCHMARKS

AIR PATHWAY

Parameter	Value	Unit
NAAQS/NESHAPS:		µg/m3
Cancer Risk:		mg/m3
Non Cancer Risk:		mg/m3

GROUND WATER PATHWAY

Parameter	Value	Unit
MCL/MCLG:	5.0E-3	mg/L
Cancer Risk:	2.1E-4	mg/L
Non Cancer Risk:	1.1E-2	mg/L

SOIL EXPOSURE PATHWAY

Parameter	Value	Unit
Cancer Risk:	1.6E+0	mg/kg
Non Cancer Risk:	2.3E+1	mg/kg

RADIONUCLIDE

Parameter	Value	Unit
MCL:		pCi/L
UMTRCA:		pCi/kg
CANCER RISK		
Air:		pCi/m3
DW:		pCi/L
FC:		pCi/kg
Soil Ing:		pCi/kg
Soil Gam:		pCi/kg

SURFACE WATER PATHWAY

DRINKING WATER

Parameter	Value	Unit
MCL/MCLG:	5.0E-3	mg/L
Cancer Risk:	2.1E-4	mg/L
Non Cancer Risk:	1.1E-2	mg/L

HUMAN FOOD CHAIN

Parameter	Value	Unit
FDAAL:		ppm
Cancer Risk:	7.9E-3	mg/kg
Non Cancer Risk:	4.1E-1	mg/kg

ENVIRONMENTAL

Parameter	Value	Unit
ACUTE		
Fresh CMC:		µg/L
Salt CMC:		µg/L
CHRONIC		
Fresh CCC:		µg/L
Salt CCC:		µg/L

HAZARD RANKING SYSTEM

Hazardous Substance Factor Values

26 Mar 2004

BI

Substance Name	CAS Number	Toxicity	Ground Water Mobility: Liquid: Karst	Ground Water Mobility: Liquid: Non-Karst	Ground Water Mobility: Non-Liquid: Karst	Ground Water Mobility: Non-Liquid: Non-Karst	Persistence: River	Persistence: Lake	Bioaccumulation: Food Chain: Fresh	Bioaccumulation: Food Chain: Salt	Bioaccumulation: Environment: Fresh	Bioaccumulation: Environment: Salt	Ecotoxicity: Fresh	Ecotoxicity: Salt	Air Gas Migration	Air Gas Mobility	Gas	Part
Trichloroethylene (TCE)	000079-01-6	10000*	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.4000	1.0000	50.0	50.0	50.0	50.0	100	10	17	1.0000	Yes	No

BII

Substance Name	CAS Number	Ground Water/Surface Water Pathway Drinking Water: MCL/MCLG (mg/L)	Ground Water/Surface Water Pathway Drinking Water: Reference Dose Screen Conc (mg/L)	Ground Water/Surface Water Pathway Drinking Water: Cancer Risk Screen Conc (mg/L)	Surface Water Pathway Food Chain: FDAAL (ppm)	Surface Water Pathway Food Chain: Ref. Dose Screen Conc (mg/kg)	Surface Water Pathway Food Chain: Cancer Risk Screen Conc (mg/kg)	Surface Water Pathway Environmental: Acute CMC (µg/L) *: Fresh	Surface Water Pathway Environmental: Acute CMC (µg/L) *: Salt	Surface Water Pathway Environmental: Chronic CCC (µg/L) *: Fresh	Surface Water Pathway Environmental: Chronic CCC (µg/L) *: Salt
Trichloroethylene (TCE)	000079-01-6	5.0E-3	1.1E-2*	2.1E-4*	...	4.1E-1*	7.9E-3*	...	...	...	...

57

Substance Name	CAS Number	AIR PATHWAY: NAAQS NESHAPS (ug/m^3)	AIR PATHWAY: Reference Dose Screen Conc (mg/m^3)	AIR PATHWAY: Cancer Risk Screen Conc (mg/m^3)	SOIL PATHWAY: Reference Dose Screen Conc (mg/kg)	SOIL PATHWAY: Cancer Risk Screen Conc (mg/kg)
Trichloroethylene (TCE)	000079-01-6	...	...	...	2.3E+1*	1.6E+0*

* Indicates difference between previous version of chemical data (JUN 96) and current version of chemical data.

** Indicates new hazardous substance in current version of chemical data (JAN04).

REFERENCE 3

~~APPENDIX E~~ GG

~~STANDARD OPERATING PROCEDURE~~ GG
T~~O DETERMINE SITE~~
LATITUDE AND LONGITUDE COORDINATES
WORKSHEET

SAN GERMAN GROUND WATER CONTAMINATION
SAN GERMAN, PR

GERRY GILLILAND
WESTON SOLUTIONS, INC.
REGION 2 SITE ASSESSMENT TEAM 2 (SAT 2)

JULY 31, 2007

~~HAZARDOUS SITE EVALUATION DIVISION~~ GG
~~SITE ASSESSMENT BRANCH~~
~~U.S ENVIRONMENTAL PROTECTION AGENCY~~
~~WASHINGTON, D.C.~~

~~September 1991~~

1. STATEMENT OF PROBLEM

Location information is critical to the site investigation process. This Standard Operating Procedure (SOP) describes the minimum standard to which latitudinal and longitudinal measurements should be recorded and how to obtain measurements from topographic maps. The investigator should complete a worksheet and attach supporting documentation, which record measurements and provide computations for review.

The purpose of this SOP is to provide a method to measure latitude and longitude which is accurate and practical. The procedure uses linear measurement and interpolation, referred to as Linear Interpolation (LI) to measure latitude and longitude. Compared to other techniques, LI:

- Requires only a single ruler or scale
- Requires no extrapolation of tangents or perpendiculars
- Requires no conversions or calculations, when using a scale graduated in seconds
- Is easy to learn
- Can be easily reviewed
- Is accurate to 1 second (± 0.5)

2. SITE REFERENCE POINT

The investigator should determine the site's geographic coordinates of a specified reference point. EPA's June 1989 draft policy simply requires describing the reference point for a site (e.g., northeast corner of site, entrance to facility, point of discharge). The January 1990 revision states: "... latitude and longitude coordinates may be made in reference to **any convenient aspect of a site**..." The language was intentionally vague due to the potentially infinite range of site spatial characteristics.

Latitude and longitude determination relies on 7.5-minute topographic maps published by the U.S. Geological Survey (USGS). At the scale of these maps (1:20,000) ~~(1:24,000)~~, the small black square used to identify a single family dwelling is a little less in width than 1 second of latitude; the latitude and longitude of a house can be accurately determined to 1 second. When the building, facility, site, etc., is larger in width than 1 second, the question becomes, "From where should I take the measurement?" In some cases, the site could encompass hundreds of square miles, and several degrees or minutes of latitude. To specify a pair of geographic coordinates for the site location, a reference point must be determined for each site on a map for the official record.

for PR GVG

To specify a single point location, remember that both natural and man-made features can change with time, and contamination can be documented outside a facility boundary. Property lines, water bodies, and buildings are particularly vulnerable to change. Give priority to the following situations when determining site reference points:

- Point representing the approximate center of the area of greatest concern or a major source as chosen by the project officer in the Region most familiar with the site; or
- Location of largest permanent structure, identified to the corner being measured.

On a 7.5-minute topographic map, mark the boundaries of the site, the area encompassing waste sources, with a very sharp pencil. If the site is a single point or building, use that point. If the building is large, select a corner and describe it for later worksheets. If the site is larger than a single building, draw a center line along the long axis (longest part) of the site (curving or segmenting the line so the line is always centered within the site), and designate the midpoint of the line as the center of the site. Mark this spot in pencil keeping the dot or cross-hair as fine as possible.

Choose a permanent site reference point that is accessible to field verification. During the site reconnaissance, verify the point location relative to topographic and physical structures on the map. Coordinates of known point locations (e.g., landfills, impoundments, wells) can also be calculated and recorded.

3. EQUIPMENT

The only equipment required for LI is an original version of the scale template, the Coordinator™ (see attached page), a fine mechanical pencil (0.3 or 0. 5 mm) , a large flat work surface, and the topographic map (s) containing the site. Mylar films of maps are preferable. Do not use folded or wrinkled field maps.

The accuracy of LI depends on several factors, specifically the accuracy of the map and measuring device, the width of the pencil, and the cartographic ability of the person making the measurements.

The accuracy of maps printed on paper is approximately 50 feet (1 millimeter map distance) due to paper shrinking or swelling in varying humidity, or by creases in the map. This error can be considerable at the 1:24,000 scale, but these problems can be overcome by using Mylar film versions of the USGS maps. Similarly, measuring tools can have different levels of precision. Do not use the Topo-Aid™, a map aid used in the past, which does not provide the 1-second precision now required by EPA.

A second area where precision can be lost is the pencil used to mark reference lines. The smaller the width of the scribe (or line drawn by the pencil), the greater the ability to align measurements to the ruler. If the width of the scribe is broader than the graduation marks on the ruler, precision cannot be greater than the width of the scribe or ruler calibration.

A third critical factor of accuracy is the cartographic ability of the measurer. There are basically two ways to measure latitude and longitude on maps. The first requires extrapolating data from the site reference point out to the map boundaries. This method requires moderate cartographic skill and accurate drafting supplies, and can magnify resulting errors in proportion to the map edge distance from the reference point. The second requires measuring data interpolated within known map reference points, thereby reducing drafting errors.

Methodologies that required drawing tangents from an unknown point on a map to the map boundary using straight-edges or right-triangles are no longer supported by EPA. The ability to align edges parallel to the map boundaries while extrapolating the tangent line is critical to the accuracy of the calculation. A difference of only a few millimeters will create coordinate errors of 1 or more seconds. Error will result from aligning the straight edge directly over the unknown point and not allowing for the width of the scribe while drawing the tangent line. Another way that locational error is introduced is by relying on other features inside the map -- such as straight roads, apparently straight survey lines, and section lines -- to extrapolate tangents.

4. PROCEDURE

4.1 DEFINING THE GRID

(1:20,000) Nine 2.5-minute map grid cells make up a USGS 7.5-minute topographic map ~~(scale 1:24,000)~~. These nine grid cells are defined by 2.5-minute tic marks at the edges of the map and 2.5-minute cross-hairs within the map. (ok) Determine which of the nine 2.5-minute grid cells contains the site center or reference point. Depending on the location of the grid, you will be required to draw two, three, or four framing lines. All measurements will be made within this grid. To draw the lines, align a straight edge so the point of the pencil will intersect two of the 2.5-minute cross-hairs. Be sure that the edge is not directly over the cross-hairs or the width of the pencil will be offset and the framing line will not exactly intersect the two cross-hairs (see Figure 4-1).

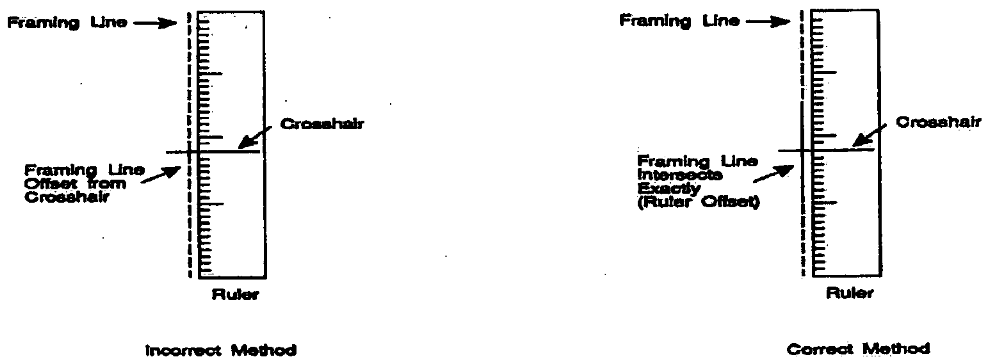


Figure 4-1. Aligning Framing Lines

Lightly draw the framing line, being careful to keep the pencil at an angle less than vertical, between 60 and 80 degrees. Strive to keep the pencil point against the straight edge at all times (see Figure 4-2).

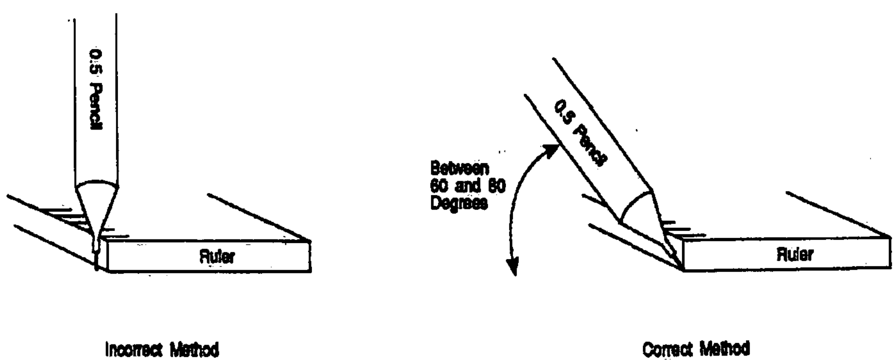


Figure 4-2. Scribing Framing Lines

After completing one of the lines, remove the straight edge and examine the line. If it does not intersect the center of the cross-hairs exactly on each end, erase the line completely and repeat the process.

NOTE: The corners of more recent 7.5 minute topographic maps may have dashed cross-hairs that differ slightly from the corners of the map. Measure from the corners of the map and not the dashed corner cross-hairs a USGS correction for the 1983 datum. Most maps still rely on the 1927 datum. Consult the lower left legend of the map for more information on geodetic datum.

DISREGARD THIS SECTION GW

4.2 LI USING RULER GRADUATED IN SECONDS

The Coordinator ™ is a clear template that is essentially eight custom rulers corresponding to the most common map scales. (The Coordinator™ can be obtained from drafting supply stores or 145 Cedar Hill Road, Bedford, NY 10506.) Other custom rulers can be used if the 1-second (or better) level of precision is maintained and documented.

Custom rulers are directly graduated in seconds of latitude. This is possible because map representations of latitude are essentially constant. One scale on the Coordinator™ fits precisely within a 2.5 minute arc of latitude on a 7.5 minute quadrangle map. By laying the scale over the site location precisely between the scribed latitude lines, latitude is read directly off the scale and added to the latitude of the lower line. With scale graduations in seconds, the accuracy of latitude to 1.0 second is ensured through direct measurement and interpolation. Directly measuring seconds prevents errors caused by conversion and ratio calculations.

Measuring Latitude Using a Custom Ruler (Coordinator™)

1. Set out Coordinator ™ 1:24,000 scale and map with the site center or reference point identified.

2. Draw 2.5-minute framing lines around the grid with the site center or reference point (see Section 4.1).

3. Fill out background information on latitude/longitude worksheet.

4. Lay the scale on the map so that the bottom of the scale coincides with the bottom framing line and the top of the scale coincides with the top framing line (see Figure 4-3).

5. Move the scale laterally until it intersects the point to be measured. Be very careful to keep the top and bottom edges of the scale on the framing lines.

6. The scale has two sets of incremental designations; the left set begins at 30 seconds and the right set begins at 0 seconds. Use the scale that corresponds to the latitude number of the lower framing line. If it ends in 30 seconds, read along the left side. If it ends in 0 seconds, read along the right side.

7. Read up the scale from the lower framing line to the point to be measured. Note at each 00 second reading on the Coordinator Scale, add 1 minute to the beginning latitude number of the lower framing line. Record that number on the worksheet.

Measuring Longitude Using a Custom Ruler (Coordinator™)

Longitude is calculated using the same principle and scale as for latitude. The difference is that the ground distances of 2.5 minutes of latitude and longitude are not the same. If, however, you use the same scale and align your divisions to those of the known longitude lines, the ratios and conversions become a linear measurement. Since the scale is exactly 2.5 minutes long, place each end of the scale on one of the longitude lines. Next, slide the scale up or down until it intersects the reference point. When the edges of the scale are precisely touching the longitude lines and the scale intersects the unknown point, read up the scale from right to left to measure the longitude.

1. Set up longitude framing lines as described in Section 4.1.

2. Lay the 1:24,000 scale on the map so that the bottom of the scale coincides with the right framing line and the top of the scale coincides with the left framing line (see Figure 4-3).

3. Move the scale up or down until it intersects the point to be measured. Be very careful to keep the top and bottom edges of the scale on the framing lines.

4. The scale has two sets of increments: the left set begins at 30 seconds and the right set begins at 0 seconds. Use the scale that corresponds to the longitude number of the right framing line. If it ends in 30 seconds, read along the left side. If it ends in 0 seconds, read along the right side.

5. Read the scale up from the right framing line to the point to be measured. Note at each 00" on the Coordinator™ scale, add 1 minute to the beginning longitude number of the lower framing line. Record that number on the worksheet.

Note: Be sure to identify starting latitude and longitude from the lower right-hand corner of the 2.5 minute grid. If it ends in 30 seconds (30"), read off the 30-second side on the scale; if it ends in 00 seconds (00"), read off the 00 side.

4.3 LI USING AN ENGINEER'S SCALE

Alternative equipment to determine latitude and longitude coordinates is an "engineer's scale." An engineer's scale is a multi-sided ruler containing series of graduations per inch corresponding to map scales. For the ~~1:24,000~~ 1:20,000 topographic maps, use the 60 divisions per inch scale; on this scale ~~454~~ 545 divisions equal to 2.5 minutes. Use the 0 as 00" and ~~454~~ 545 as 2'30" and follow the alignment process of Section 4.2. Record the number of divisions on the ruler, divide by ~~454~~ 545 and multiply the resultant by 150. The number is now in seconds and can be added to the starting latitude or longitude to get the coordinates of the site.

<u>Measuring Latitude and Longitude using an Engineer's Scale</u>

1. Display the 1/60 engineer's scale and map with the site center or reference point site identified.

2. Draw 2.5-minute framing lines on the grid with the site center or reference point (see Section 4.1).

3. Fill out background information on the latitude/longitude worksheet.

4. For latitude: place the 1/60 scale on the map so that the bottom of the ruler coincides with the bottom framing line and ~~454~~ 545 coincides with the top framing line (see Figure 4-3).

   For longitude: place the scale on the map so that the bottom of the ruler coincides with the right framing line and ~~454~~ 545 coincides with the left framing line (see Figure 4-3).

5. Move the scale laterally (for latitude) or vertically (for longitude) until the scale intersects the point to be measured. Be very careful to keep the 0 and ~~454~~ 545 edges of the scale on the framing lines.

6. Record the number on the ruler where it intersects the point to be measured on the appropriate worksheet. Divide that number by ~~454~~ 545 and multiply the resultant by 150. **OR** multiply the number by ~~0.3304~~ 0.2752 The number is now in seconds and can be added to the starting latitude or longitude of the grid to get the latitude or longitude coordinates of the site. Complete the worksheet.

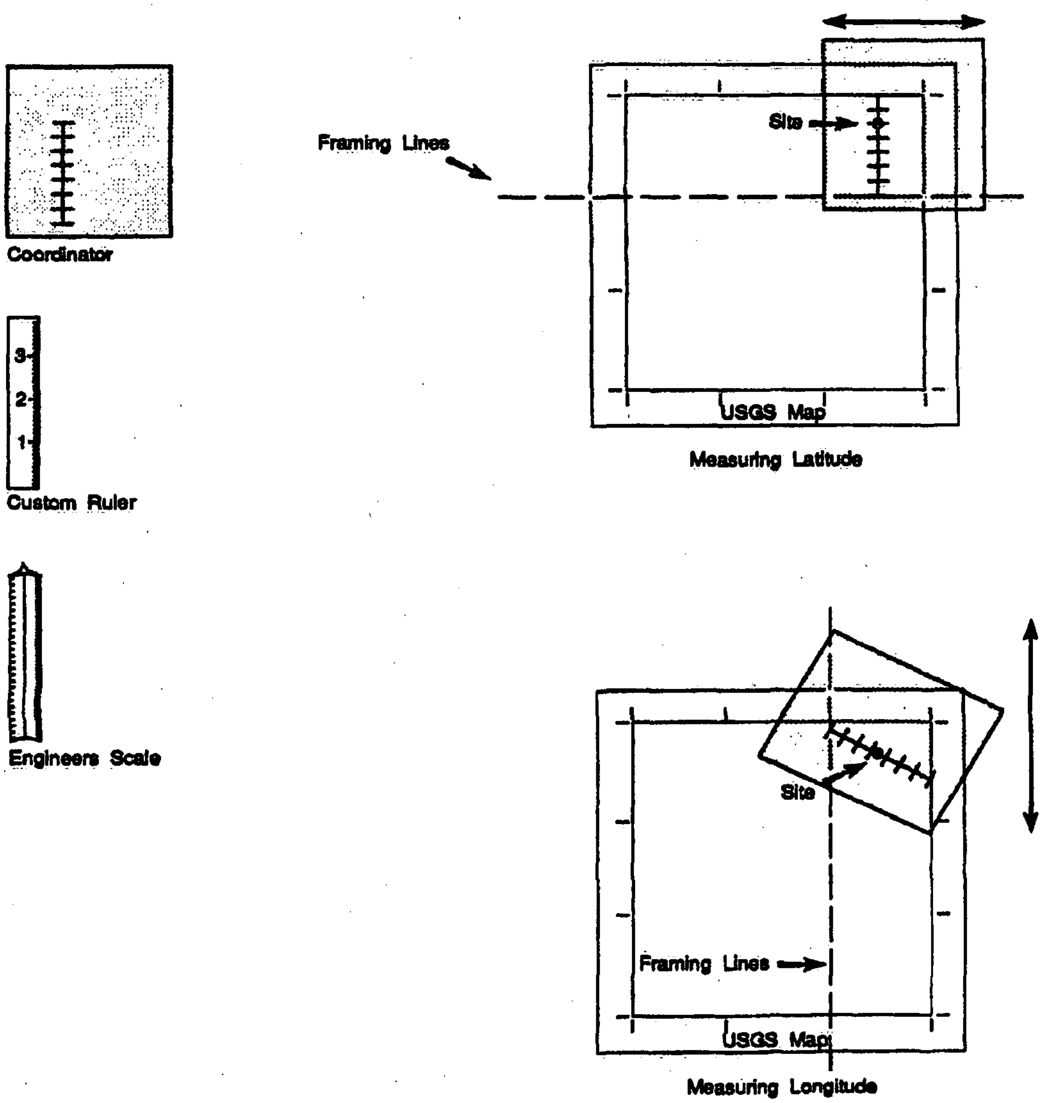


Figure 4-3. Determining Latitude and Longitude Using Linear Interpolation

5. QUALITY ASSURANCE

For QA purposes, a method must be developed to track how latitude and longitude coordinates have been verified and calculated. A datasheet (worksheet) is part of the required documentation for each PA. A completed worksheet allows a reviewer to follow the original steps and check the calculations. Completing each form is estimated to take approximately 10 minutes. Attach a complete 2.5-minute grid on a separate page with the site center or reference point clearly marked. All four corners of the grid must be clearly visible.

LATITUDE AND LONGITUDE CALCULATION WORKSHEET #1
LI USING CUSTOM RULER OR COORDINATOR™

16W

SITE NAME: ______________________ CERCLIS #: ______________

AKA: ______________________ SSID: ______________

ADDRESS: ______________________

CITY: ______________ STATE: ________ ZIP CODE: ______________

SITE REFERENCE POINT: ______________________

USGS QUAD MAP NAME: ______________ TOWNSHIP: ____ N/S RANGE: ____ E/W

SCALE: 1:24,000 MAP DATE: ________ SECTION: ____1/4 ____1/4 ____1/4

MAP DATUM: 1927 1983 (CIRCLE ONE) MERIDIAN: ______________

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 7.5' MAP (attach photocopy):

LONGITUDE: ____° ____' ____" LATITUDE: ____° ____' ____"

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 2.5' GRID CELL:

LONGITUDE: ____° ____' ____" LATITUDE: ____° ____' ____"

CALCULATIONS: LATITUDE (7.5' QUADRANGLE MAP)

A) ALIGN THE BOTTOM OF THE SCALE WITH BOTTOM OF GRID. ALIGN THE TOP OF THE SCALE WITH THE TOP OF GRID. POSITION EDGE OF RULER OVER SITE REFERENCE POINT WHILE KEEPING TOP AND BOTTOM ALIGNED.

B) READ TICS ON RULER AT 1- OR 0.5-SECOND INTERVALS (INTERPOLATE).

C) EXPRESS IN MINUTES AND SECONDS (1'= 60"): ____'____.____"

D) ADD TO STARTING LATITUDE: ____°____'____.____" + ____'____.____ =

SITE LATITUDE: ____°____'____.____"

CALCULATIONS: LONGITUDE (7.5' QUADRANGLE MAP)

A) ALIGN THE BOTTOM OF THE SCALE WITH RIGHT SIDE OF GRID. ALIGN THE TOP OF THE SCALE WITH THE LEFT SIDE OF GRID. POSITION EDGE OF RULER OVER SITE REFERENCE POINT WHILE KEEPING TOP AND BOTTOM ALIGNED.

B) READ TICS ON RULER AT 1- or 0.5-SECOND INTERVALS. (INTERPOLATE)

C) EXPRESS IN MINUTES AND SECONDS (1'= 60"): ____'____.____"

D) ADD TO STARTING LONGITUDE: ____°____'____.____" + ____'____.____ =

SITE LONGITUDE: ____°____'____.____"

INVESTIGATOR: ______________________ DATE: __________

LATITUDE AND LONGITUDE CALCULATION WORKSHEET ~~#2~~ #6
LI USING ENGINEER'S SCALE (1/60)

SITE NAME: San German Groundwater Contamination CERCLIS #: PRN000205957

AKA: ______ SSID: ______

ADDRESS: State Road #122 (a.k.a. Road 119)

CITY: San German STATE: PR ZIP CODE: 00683

SITE REFERENCE POINT: center of area of observed ground water contamination

USGS QUAD MAP NAME: San German, PR TOWNSHIP: ___ N/S RANGE: ___ E/W

SCALE: ~~1:24,000~~ 1:20,000 MAP DATE: ______ SECTION: ___1/4 ___1/4 ___1/4

MAP DATUM: ~~1927~~ ~~1983~~ 1940 (CIRCLE ONE) MERIDIAN: ______

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 7.5' MAP (attach photocopy):

LONGITUDE: 67° 00' 00" LATITUDE: 18° 00' 00"

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 2.5' GRID CELL:

LONGITUDE: 67° 00' 00" LATITUDE: 18° 05' 00"

CALCULATIONS: LATITUDE (7.5' QUADRANGLE MAP)

A) NUMBER OF RULER GRADUATIONS FROM LATITUDE GRID LINE TO SITE REF POINT: 15

B) MULTIPLY (A) BY ~~0.3304~~ 0.2752 TO CONVERT TO SECONDS:

A x ~~0.3304~~ 0.2752 = 04.1"

C) EXPRESS IN MINUTES AND SECONDS (1'= 60"): 00' 04.1"

D) ADD TO STARTING LATITUDE: 18° 05' 00.0" + 00' 04.1" =

SITE LATITUDE: 18° 05' 04.1"	N

CALCULATIONS: LONGITUDE (7.5' QUADRANGLE MAP)

A) NUMBER OF RULER GRADUATIONS FROM RIGHT LONGITUDE LINE TO SITE REF POINT: 462

B) MULTIPLY (A) BY ~~0.3304~~ 0.2752 TO CONVERT TO SECONDS:

A x ~~0.3304~~ 0.2752 = 127.1"

C) EXPRESS IN MINUTES AND SECONDS (1'= 60"): 02' 07.1"

D) ADD TO STARTING LONGITUDE: 67° 00' 00.0" + 02' 07.1" =

SITE LONGITUDE: 67° 02' 07.1"	W

INVESTIGATOR: Gerry Gilliland, WESTON DATE: 7/31/07
Region 2 SAT 2

[signature]

SITE NAME: San German Groundwater Contam. NUMBER: PRN000205957

AFFIX MAP GRID CELL HERE

Map must have a minimum of ¼ inch
around the 2.5′ grid cell and show all four grid tic marks.

- Indicate permanent site reference point
- Indicate boundary of site/sources

See attached map

TOPOGRAPHIC MAP QUADRANGLE NAME: San German, PR SCALE: ~~1:24,000~~ 1:20,000

COORDINATES OF LOWER RIGHT-HAND CORNER OF 2.5-MINUTE GRID:

LATITUDE: 18 ° 05 ' 00 " LONGITUDE: 67 ° 00 ' 00 "

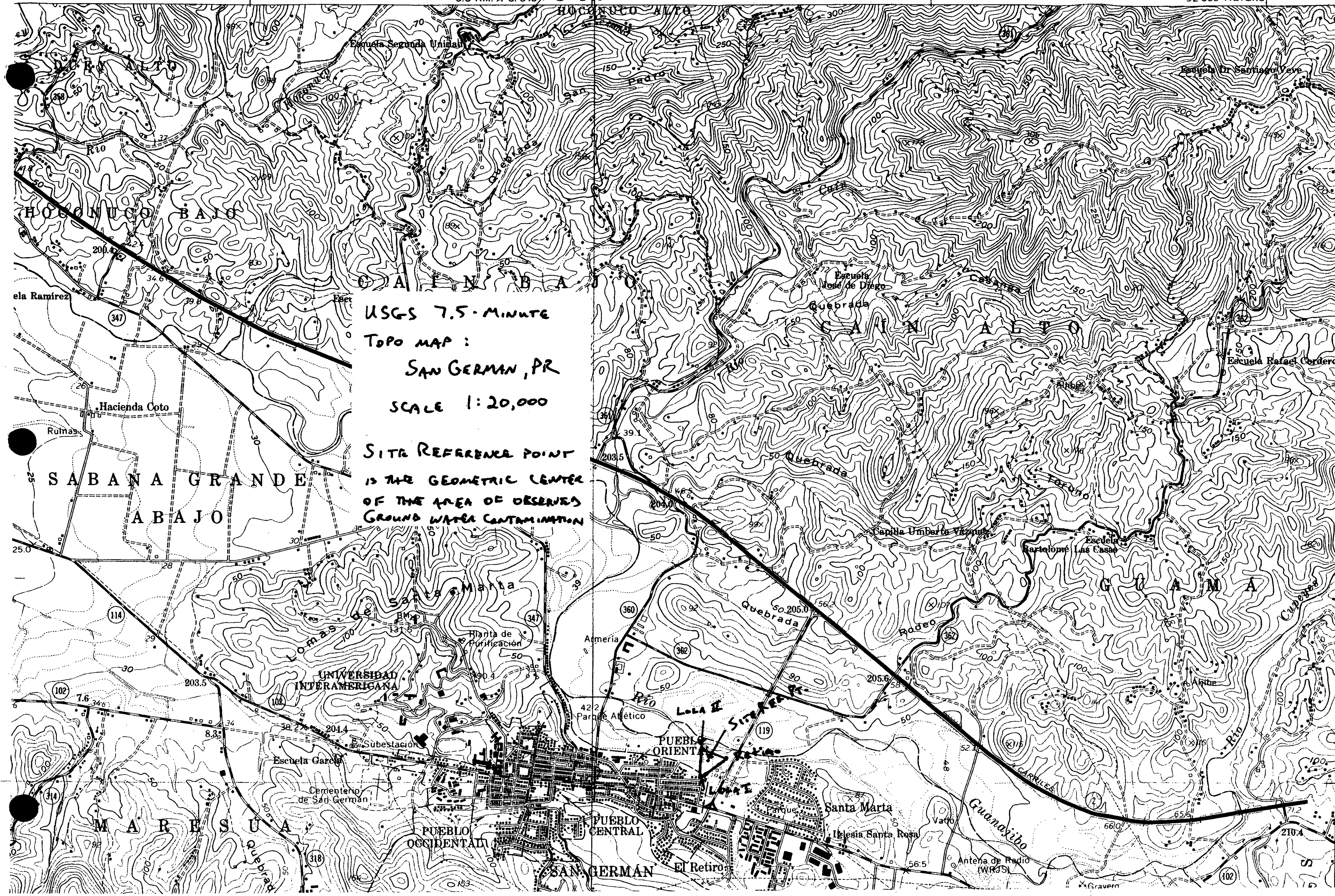
11

INTENTIONALLY

BLANK

FRANCISCO LIZARDI, SECRETARY

7.5 MINUTE SERIES (TOPOGRAPHIC)



(12)

REFERENCE 4

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

COMMONWEALTH OF PUERTO RICO
DEPARTMENT OF PUBLIC WORKS
FRANCISCO LIZARDI, SECRETARY

SAN GERMAN QUADRANGLE
PUERTO RICO
7.5 MINUTE SERIES (TOPOGRAPHIC)

Mapped, edited, and published by the Geological Survey

SCALE 1:20000

CONTOUR INTERVAL 10 METERS

FOR SALE BY U. S. GEOLOGICAL SURVEY, WASHINGTON, D. C. 20242
AND DEPARTMENT OF PUBLIC WORKS, SAN JUAN, PUERTO RICO 00910
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

ROAD CLASSIFICATION

SAN GERMAN, P. R.

1966

REFERENCE 5

WESTON SOLUTIONS, INC.
SITE ASSESSMENT TEAM 2
PROJECT NOTE

TO: San German Groundwater Contamination File (W.A. No.: 52)
FROM: Dennis J. Foerter, CHMM
DATE: 24 October 2006

SUBJECT: Analytical Data – PRASA San German Urbano Wells

Attached are analytical data sheets for wells associated with the Puerto Rico Aqueduct and Sewer Authority's San German Urbano system. The wells include Retiro, Lola Rodriguez de Tio I, and Lola Rodriguez de Tio II. Samples were collected between 2001 and 2005.

This data was obtained during a visit at the Central PRASA Laboratory located in Caguas, Puerto Rico in November 2005. During this review, SAT 2 (i.e., Michele Capriglione) and EPA personnel reviewed analytical data collected by PRASA for years 2001 through 2005. SAT 2 and EPA reviewed the quarterly monitoring data for wells and filtration plants and copied each data sheet which demonstrated a detection, excluding detections of trihalomethanes. (i.e., chloroform, bromodichloromethane, dibromochloromethane, and bromoform). According to Michele Capriglione of SAT 2, if a review of analytical data from wells within the San German Urbano system did not indicate concentrations of VOCs above the detection limit, the data sheet was not copied and obtained by SAT 2. Therefore, quarterly analytical data for El Real, Providencia I, Providencia II were reviewed for the period of 2001 to 2005 and determined not to have detectable concentrations of volatile organic compounds.

Signature/Date 10/24/06

LABORATORIO CENTRAL CAGUAS - A.A.A.

INFORME DE VOC

Region: *SUROESTE*

PWSID: *3323*

No.Muestra: 01-M-0708
Fecha: 4/26/01
Metodo: 524.2

Fecha Informado: 5/9/01
Unidad_medida: ppm
v = violación * = contratada

Procedencia: *POZO LOLA RODRIGUEZ #2*

		Resultado mg/ L	MCL mg/ L			Resultado mg/ L	MCL mg/ L
Benceno	<	0.0005	0.005	Dibromometano	<	0.0005	
Bromobenceno	<	0.0005		1,2-Diclorobenceno	<	0.0005	0.6
Bromoclorometano	<	0.0005		1,3-Diclorobenceno	<	0.0005	
Bromometano	<	0.0005		1,4-Diclorobenceno	<	0.0005	0.075
N-butilbenceno	<	0.0005		Diclorodifluorometano	<	0.0005	
Sec-butilbenceno	<	0.0005		1,1-Dicloroetano	<	0.0005	
Tert-butilbenceno	<	0.0005		1,2-Dicloroetano	<	0.0005	0.005
Tetracloruro carbono	<	0.0005	0.005	1,1-Dicloroeteno	<	0.0005	0.007
Clorobenceno	<	0.0005	0.1	Cis-1,2-Dicloroeteno	<	0.0005	0.07
Cloroetano	<	0.0005		Trans-1,2-Dicloroeteno	<	0.0005	0.1
Clorometano	<	0.0005		1,2-Dicloropropan	<	0.0005	0.005
2-Clorotolueno	<	0.0005		1,3-Dicloropropano	<	0.0005	
4-Clorotolueno	<	0.0005		2,2-Dicloropropano	<	0.0005	
Tetracloroeteno		0.0025	0.005	1,1-Dicloropropeno	<	0.0005	
Tolueno	<	0.0005	1.0	Etilbenceno	<	0.0005	0.7
1,2,3-Triclorobenceno	<	0.0005		Hexaclorobutadileno	<	0.0005	
1,2,4-Triclorobenceno	<	0.0005	0.07	Isopropilbenceno	<	0.0005	
1,1,1-Tricloroetano	<	0.0005	0.2	p-Isopropilbenceno	<	0.0005	
1,1,2-Tricloroetano	<	0.0005	0.005	p-Isopropiltolueno	<	0.0005	
Tricloroeteno	<	0.0005	0.005	Naftaleno	<	0.0005	
Triclorofluorumetano	<	0.0005		N-propilbenceno	<	0.0005	
1,2,3-Tricloropropano	<	0.0005		Estireno	<	0.0005	0.1
1,2,4-Trimetilbenceno	<	0.0005		Diclorometano	<	0.0005	0.005
1,3,5-Trimetilbenceno	<	0.0005		1,1,1,2-Tetracloroetano	<	0.0005	
Cloruro de vinilo	<	0.0005	0.002	1,1,2,2-Tetracloroetano	<	0.0005	
Xileno total	<	0.0005	10	Cis-1,3-Dicloropropeno	<	0.0005	
				Trans-1,3-Dicloropropeno	<	0.0005	

ESTADO LIBRE ASOCIADO DE PUERTO RICO
LUZ A. ORTIZ
Lic. 3135
QUIMICO LICENCIADO

Químico

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Luis E.
Berrios Aguiló
Lic. 2402
QUIMICO LICENCIADO

Supervisor Depto. Orgánico

AUTORIDAD DE ACUEDUCTOS Y ALCANTARILLADOS
LABORATORIO CENTRAL "CAGUAS"
HOJA DE CADENA DE CUSTODIA PARA ANALISIS QUIMICO AGUA POTABLE
(FAVOR DE LLENAR EN LETRA DE MOLDE, CON TINTA NEGRA Y ESCRIBA CLARO)

ESTACION DE MUESTREO	PROCEDENCIA	NUMERO DE MUESTRA
Lab. [illegible]	Pozo Retiro	01-0706

FECHA DE MUESTREO	HORA DE MUESTREO	TELEFONO	PWSID / ID NUM	MUESTREADO POR:
4-26-01	10:05 AM	——	7323	A. [illegible]

ANALISIS	CONT.	ENV.	# ENV.	VOLUMEN	PRESERVATIVO	TIEMPO DE RETENCION	D	Se	M	T	S	A
ACEITES Y GRASAS		C		1 LITRO	H_2SO_4, pH<2, 4°C	28 DIAS						
ALCALINIDAD		P		1 LITRO	4°C	14 DIAS						
AMONIA		P		2 LITRO	H_2SO_4, pH<2, 4°C	28 DIAS						
BORO		P		1 LITRO	HNO_3 pH<2	6 MESES						
CIANURO		P		500 ML	4°C, NaOH pH>12, ACIDO ASC.	14 DIAS						
CLORUROS		P		1 LITRO	4°C	28 DIAS						
COLOR		P		1 LITRO	4°C	48 HORAS						
CONDUCTIVIDAD		P		1 LITRO	4°C	28 DIAS						
CORROSIVIDAD **		P		1 LITRO	4°C	7 DIAS						
DUREZA		P		1 LITRO	4°C, HNO_3, pH<2	6 MESES						
FLUORURO		P		1 LITRO	NO REQUIERE	28 DIAS						
HAAc		C		250 ML	NH_4CL, 4°C	14 DIAS						
METALES		P		1 LITRO	HNO_3, pH<2	6 MESES						
MERCURIO	✓	C	/	500 ML	HNO_3, pH<2	28 DIAS						
NITRATOS		P		1 LITRO	4°C	48 HORAS						
NITRITOS		P		1 LITRO	4°C	48 HORAS						
SOLIDOS TOTALES		P		1 LITRO	4°C	7 DIAS						
SULFATO		P		1 LITRO	4°C	28 DIAS						
SURFACTANTES		P		1 LITRO	4°C	48 HORAS						
TURBIEDAD		P		1 LITRO	4°C	48 HORAS						
THM *		C,T		40 ML	$Na_2S_2O_3$, 4°C	14 DIAS						
TOC		C,T		250 ML	H_2SO_4, 4°C	28 DIAS						
TPH		C,A		500 ML	H_2SO_4, pH<2, 4°C	28 DIAS						
[illegible]	✓	C,T	2	40 ML	4°C, ACIDO ASC., HCl 1+1	14 DIAS						
504.1 *		C,T		40 ML	$Na_2S_2O_3$, 4°C	14 DIAS						
505 ***		C,T		40 ML	$Na_2S_2O_3$, 4°C	14 DIAS						
515.1		C,A,T		1 LITRO	$Na_2S_2O_3$, 4°C	14 DIAS						
547		C,T		40 ML	$Na_2S_2O_3$, 4°C	14 DIAS						
508.1		C		1 LITRO	Na_2SO_3, HCl pH<2, 4°C	14 DIAS						
525.2 *		C,T		1 LITRO	Na_2SO_3, HCl pH<2, 4°C	14 DIAS						
531.1		C,T		40 ML	MCAA, pH< 3 $Na_2S_2O_3$, 4°C	28 DIAS						
548.1		C,A		1 LITRO	$Na_2S_2O_3$, 4°C, HCl pH (1.5 - 2)	7 DIAS						
549.1		C,A,S P,HD,A		1 LITRO	H_2SO_4, pH<2 $Na_2S_2O_3$, 4°C	7 DIAS						

LEYENDAS

CONT. = LAB. CONTRATADO
ENV. = ENVASE
C = CRISTAL P = PLASTICO
A = AMBAR S = SILANIZADO
T = TAPA DE TEFLON
HD = ALTA DENSIDAD
D = DIARIO T = TRIMESTRAL
Se = SEMANAL S = SEMESTRAL
M = MENSUAL A = ANUAL
(*) REQUIERE CONTROL
(**) 48 HRS. TIEMPO DE RETENCION SI SE LE HACE COLOR Y TURBIEDAD
(***) SI SE ANALIZA HEPTACHLOR 7 DIAS TIEMPO DE RETENCION

PRESERVATIVO

ACIDO ASC. = ACIDO ASCORBICO
HCl = ACIDO CLORHIDRICO
HNO_3 = ACIDO NITRICO
H_2SO_4 = ACIDO SULFURICO
NaOH = HIDROXIDO DE SODIO
MCAA = ACIDO MONOCLOROACETICO
$Na_2S_2O_3$ = TIOSULFATO DE SODIO
Na_2SO_3 = SULFITO DE SODIO

TIPO DE MUESTRA

RUTINA	
ESPECIAL	
OTRAS	

CONTROLES / FECHA PREPARADO

THM-
VOC- 472 (4-24-01)
504.1-
525.2-

RESULTADOS DE CAMPO

TEMP. MUESTRA	24.5°C
pH MUESTRA	7.5
CLORO RESIDUAL	2.6
CLORO TOTAL	2.2

COMENTARIOS: (H' Cl [illegible])

ENTREGADO POR:	FECHA	HORA	# ENV.	PILOTO (1 - 4°C)	RECIBIDO POR:
1 [signature]	4-26-01	4:00 PM	2	2°	[signature]
2 [signature]	[illegible]	[illegible]	2		[signature]
3 [signature]	4/27/01	9:30	2		[signature]
4					

QA 025C REV. NOVIEMBRE / 00

AUTORIDAD DE ACUEDUCTOS Y ALCANTARILLADOS
LABORATORIO CENTRAL CAGUAS
HOJA DE CADENA DE CUSTODIA PARA ANALISIS QUIMICO AGUA POTABLE

(FAVOR DE LLENAR EN LETRA DE MOLDE, CON TINTA NEGRA Y ESCRIBA CLARO)

ESTACION DE MUESTREO	PROCEDENCIA	NUMERO DE MUESTRA
Lab. agua [illegible]	[illegible] Rodriguez [illegible] 710 I	01-0707

FECHA DE MUESTREO	HORA DE MUESTREO	TELEFONO	PWSID / ID NUM	MUESTREADO POR:
4-26-01	10:30 AM	—	3523	[illegible]

ANALISIS	CONT.	ENV.	# ENV.	VOLUMEN	PRESERVATIVO	TIEMPO DE RETENCION	D	Se	M	T	S	A
ACEITES Y GRASAS		C		1 LITRO	H_2SO_4, pH<2, 4°C	28 DIAS						
ALCALINIDAD		P		1 LITRO	4°C	14 DIAS						
AMONIA		P		2 LITRO	H_2SO_4, pH<2, 4°C	28 DIAS						
BORO		P		1 LITRO	HNO_3, pH<2	6 MESES						
CIANURO		P		500 ML	4°C, NaOH pH>12, ACIDO ASC.	14 DIAS						
CLORUROS		P		1 LITRO	4°C	28 DIAS						
COLOR		P		1 LITRO	4°C	48 HORAS						
CONDUCTIVIDAD		P		1 LITRO	4°C	28 DIAS						
CORROSIVIDAD **		P		1 LITRO	4°C	7 DIAS						
DUREZA		P		1 LITRO	4°C, HNO_3, pH<2	6 MESES						
FLUORURO		P		1 LITRO	NO REQUIERE	28 DIAS						
HAAc		C		250 ML	NH_4Cl, 4°C	14 DIAS						
METALES		P		1 LITRO	HNO_3, pH<2	6 MESES						
MERCURIO		C		500 ML	HNO_3, pH<2	28 DIAS						
NITRATOS		P		1 LITRO	4°C	48 HORAS						
NITRITOS		P		1 LITRO	4°C	48 HORAS						
SOLIDOS TOTALES		P		1 LITRO	4°C	7 DIAS						
SULFATO		P		1 LITRO	4°C	28 DIAS						
SURFACTANTES		P		1 LITRO	4°C	48 HORAS						
TURBIEDAD		P		1 LITRO	4°C	48 HORAS						
THM *		C,T		40 ML	$Na_2S_2O_3$, 4°C	14 DIAS						
TOC		C,T		250 ML	H_2SO_4, 4°C	28 DIAS						
TPH		C,A		500 ML	H_2SO_4, pH<2, 4°C	28 DIAS						
[illegible]	✓	C,T	2	40 ML	4°C, ACIDO ASC., HCl 1+1	14 DIAS						
504.1 *		C,T		40 ML	$Na_2S_2O_3$, 4°C	14 DIAS						
505 ***		C,T		40 ML	$Na_2S_2O_3$, 4°C	14 DIAS						
515.1		C,A,T		1 LITRO	$Na_2S_2O_3$, 4°C	14 DIAS						
547		C,T		40 ML	$Na_2S_2O_3$, 4°C	14 DIAS						
508.1		C		1 LITRO	Na_2SO_3, HCl pH<2, 4°C	14 DIAS						
525.2 *		C,T		1 LITRO	Na_2SO_3, HCl pH<2, 4°C	14 DIAS						
531.1		C,T		40 ML	MCAA, pH<3 $Na_2S_2O_3$, 4°C	28 DIAS						
548.1		C,A		1 LITRO	$Na_2S_2O_3$, 4°C, HCl pH (1.5 - 2)	7 DIAS						
549.1		C,A,S P,HD,A		1 LITRO	H_2SO_4, pH<2 $Na_2S_2O_3$, 4°C	7 DIAS						

LEYENDAS

- CONT. = LAB. CONTRATADO
- ENV. = ENVASE
- C = CRISTAL P = PLASTICO
- A = AMBAR S = SILANIZADO
- T = TAPA DE TEFLON
- HD = ALTA DENSIDAD
- D = DIARIO T = TRIMESTRAL
- Se = SEMANAL S = SEMESTRAL
- M = MENSUAL A = ANUAL
- (*) REQUIERE CONTROL
- (**) 48 HRS. TIEMPO DE RETENCION SI SE LE HACE COLOR Y TURBIEDAD
- (***) SI SE ANALIZA HEPTACHLOR 7 DIAS TIEMPO DE RETENCION

PRESERVATIVO:

- ACIDO ASC. = ACIDO ASCORBICO
- HCl = ACIDO CLORHIDRICO
- HNO_3 = ACIDO NITRICO
- H_2SO_4 = ACIDO SULFURICO
- NaOH = HIDROXIDO DE SODIO
- MCAA = ACIDO MONOCLOROACETICO
- $Na_2S_2O_3$ = TIOSULFATO DE SODIO
- Na_2SO_3 = SULFITO DE SODIO

TIPO DE MUESTRA:

RUTINA	
ESPECIAL	
OTRAS	

CONTROLES / FECHA PREPARADO:

- THM-
- VOC- 478 (4-24-01)
- 504.1-
- 525.2-

RESULTADOS DE CAMPO:

TEMP. MUESTRA	25 °C
pH MUESTRA	7.4
CLORO RESIDUAL	2.3
CLORO TOTAL	2.5

COMENTARIOS: [illegible]

ENTREGADO POR:	FECHA	HORA	# ENV.	PILOTO (1 - 4°C)	RECIBIDO POR:
1 [illegible]	4-26-01	4:00 Pm	2	2°	[illegible]
2 [illegible]	4-26-01	7:15 Pm	2	2	[illegible]
3 [illegible]	4/27/01	930	2		[illegible]
4					

AA 0258 REV. NOVIEMBRE / 00

COMPAÑIA DE AGUAS
DE PUERTO RICO
P.O. Box 7066, Bo. Obrero Sta
San Juan, P.R. 00916

Attn: Mr. Raymond Sandza

EQ Lab. Sample Number: 139934
PRASA Sample Number: 01M0709
PWSID: 3323
Sample Description: Drinking Water - Grab
Source: Pozo Lola 2

Page Number: 1
Date Collected: 04/26/01
Date Received: 04/27/01
Date Reported: 05/09/01

Parameter	Result	Units	MDL /MCL	Date Analyzed	Analysts
Volatiles Organic Compounds (EPA 524.2)					
Benzene	<0.0005	mg/L	0.0005 / 0.0050	05/03/01	GR
Bromobenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Bromochloromethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Bromodichloromethane	<0.0005	mg/L	Note # 2	05/03/01	GR
Bromoform	<0.0005	mg/L	Note # 2	05/03/01	GR
Bromomethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Carbon tetrachloride	<0.0005	mg/L	0.0005 / 0.0050	05/03/01	GR
Chlorobenzene	<0.0005	mg/L	0.0005 / 0.10	05/03/01	GR
Chloroethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Chloroform	0.0006	mg/L	Note # 2	05/03/01	GR
Chloromethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
2-Chlorotoluene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
4-Chlorotoluene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Dibromochloromethane	<0.0005	mg/L	Note # 2	05/03/01	GR
1,2-Dibromo-3-chloropropane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,2-Dibromoethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Dibromomethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,2-Dichlorobenzene	<0.0005	mg/L	0.0005 / 0.60	05/03/01	GR
1,3-Dichlorobenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,4-Dichlorobenzene	<0.0005	mg/L	0.0005 / 0.075	05/03/01	GR
Dichlorodifluoromethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,1-Dichloroethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,2-Dichloroethane	<0.0005	mg/L	0.0005 / 0.0050	05/03/01	GR
1,1-Dichloroethene	<0.0005	mg/L	0.0005 / 0.0070	05/03/01	GR
cis-1,2-Dichloroethene	<0.0005	mg/L	0.0005 / 0.070	05/03/01	GR
trans-1,2-Dichloroethene	<0.0005	mg/L	0.0005 / 0.10	05/03/01	GR
Dichloromethane	<0.0005	mg/L	0.0005 / 0.0050	05/03/01	GR
1,2-Dichloropropane	<0.0005	mg/L	0.0005 / 0.0050	05/03/01	GR
1,3-Dichloropropane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
2,2-Dichloropropane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,1-Dichloropropene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
cis-1,3-Dichloropropene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR

5

COMPAÑIA DE AGUAS
DE PUERTO RICO
P.O. Box 7066, Bo. Obrero Sta
San Juan, P.R. 00916

Attn: Mr. Raymond Sandza

EQ Lab. Sample Number: 139934
PRASA Sample Number: 01M0709
PWSID: 3323
Sample Description: Drinking Water - Grab
Source: Pozo Lola 2

Page Number: 2
Date Collected: 04/26/01
Date Received: 04/27/01
Date Reported: 05/09/01

Parameter	Result	Units	MDL /MCL	Date Analyzed	Analysts
Volatiles Organic Compounds (EPA 524.2)					
trans-1,3-Dichloropropene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Ethylbenzene	<0.0005	mg/L	0.0005 / 0.70	05/03/01	GR
Styrene	<0.0005	mg/L	0.0005 / 0.10	05/03/01	GR
1,1,1,2-Tetrachloroethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,1,2,2-Tetrachloroethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Tetrachloroethene	0.0026	mg/L	0.0005 / 0.0050	05/03/01	GR
Toluene	<0.0005	mg/L	0.0005 / 1.0	05/03/01	GR
1,2,4-Trichlorobenzene	<0.0005	mg/L	0.0005 / 0.070	05/03/01	GR
1,1,1-Trichloroethane	<0.0005	mg/L	0.0005 / 0.20	05/03/01	GR
1,1,2-Trichloroethane	<0.0005	mg/L	0.0005 / 0.0050	05/03/01	GR
Trichloroethene	<0.0005	mg/L	0.0005 / 0.0050	05/03/01	GR
Trichlorofluoromethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,2,3-Trichloropropane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Vinyl chloride	<0.0005	mg/L	0.0005 / 0.0020	05/03/01	GR
m,p-Xylenes (Note #1)	<0.0005	mg/L	0.0005 / 10	05/03/01	GR
o-Xylenes (Note #1)	<0.0005	mg/L	0.0005 / 10	05/03/01	GR
n-Butylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
sec-Butylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
tert-Butylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Hexachlorobutadiene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Isopropylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
4-Isopropyltoluene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Naphthalene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
n-Propylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,2,3-Trichlorobenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,2,4-Trimethylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,3,5-Trimethylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR

N.R = Not regulated

Note #1: DOH report format provides only one space for the PCB's and Xylenes. EQ Lab is reporting each of the Arochlors for PCB's and the individual Xylenes.

Please refer to our Laboratory Tests Results.

Note # 2: The regulated limit for Total Trihalomethanes is 0.100 mg/L and must be compara to the sum of the four Trihalomethanes indified with this note.

6

COMPAÑIA DE AGUAS
DE PUERTO RICO
P.O. Box 7066, Bo. Obrero Sta
San Juan, P.R. 00916

Attn: Mr. Raymond Sandza

eqlab ENVIRONMENTAL QUALITY LABORATORIES, INC.

EQ Lab. Sample Number: 139934
PRASA Sample Number: 01M0709
PWSID: 3323
Sample Description: Drinking Water - Grab
Source: Pozo Lola 2

Page Number: 1
Date Collected: 04/26/01
Date Received: 04/27/01
Date Reported: 05/09/01

Parameter	Result	Units	MDL /MCL	Date Analyzed	Analysts
Volatiles Organic Compounds (EPA 524.2)					
Benzene	<0.0005	mg/L	0.0005 / 0.0050	05/03/01	GR
Bromobenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Bromochloromethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Bromodichloromethane	<0.0005	mg/L	Note # 2	05/03/01	GR
Bromoform	<0.0005	mg/L	Note # 2	05/03/01	GR
Bromomethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Carbon tetrachloride	<0.0005	mg/L	0.0005 / 0.0050	05/03/01	GR
Chlorobenzene	<0.0005	mg/L	0.0005 / 0.10	05/03/01	GR
Chloroethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Chloroform	0.0006	mg/L	Note # 2	05/03/01	GR
Chloromethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
2-Chlorotoluene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
4-Chlorotoluene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Dibromochloromethane	<0.0005	mg/L	Note # 2	05/03/01	GR
1,2-Dibromo-3-chloropropane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,2-Dibromoethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Dibromomethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,2-Dichlorobenzene	<0.0005	mg/L	0.0005 / 0.60	05/03/01	GR
1,3-Dichlorobenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,4-Dichlorobenzene	<0.0005	mg/L	0.0005 / 0.075	05/03/01	GR
Dichlorodifluoromethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,1-Dichloroethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,2-Dichloroethane	<0.0005	mg/L	0.0005 / 0.0050	05/03/01	GR
1,1-Dichloroethene	<0.0005	mg/L	0.0005 / 0.0070	05/03/01	GR
cis-1,2-Dichloroethene	<0.0005	mg/L	0.0005 / 0.070	05/03/01	GR
trans-1,2-Dichloroethene	<0.0005	mg/L	0.0005 / 0.10	05/03/01	GR
Dichloromethane	<0.0005	mg/L	0.0005 / 0.0050	05/03/01	GR
1,2-Dichloropropane	<0.0005	mg/L	0.0005 / 0.0050	05/03/01	GR
1,3-Dichloropropane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
2,2-Dichloropropane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,1-Dichloropropene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
cis-1,3-Dichloropropene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR

7

COMPAÑIA DE AGUAS
DE PUERTO RICO
P.O. Box 7066, Bo. Obrero Sta
San Juan, P.R. 00916

Attn: Mr. Raymond Sandza

eqlab ENVIRONMENTAL QUALITY LABORATORIES, INC.

EQ Lab. Sample Number: 139934
PRASA Sample Number: 01M0709
PWSID: 3323
Sample Description: Drinking Water - Grab
Source: Pozo Lola 2

Page Number: 2
Date Collected: 04/26/01
Date Received: 04/27/01
Date Reported: 05/09/01

Parameter	Result	Units	MDL /MCL	Date Analyzed	Analysts
Volatiles Organic Compounds (EPA 524.2)					
trans-1,3-Dichloropropene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Ethylbenzene	<0.0005	mg/L	0.0005 / 0.70	05/03/01	GR
Styrene	<0.0005	mg/L	0.0005 / 0.10	05/03/01	GR
1,1,1,2-Tetrachloroethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,1,2,2-Tetrachloroethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Tetrachloroethene	0.0026	mg/L	0.0005 / 0.0050	05/03/01	GR
Toluene	<0.0005	mg/L	0.0005 / 1.0	05/03/01	GR
1,2,4-Trichlorobenzene	<0.0005	mg/L	0.0005 / 0.070	05/03/01	GR
1,1,1-Trichloroethane	<0.0005	mg/L	0.0005 / 0.20	05/03/01	GR
1,1,2-Trichloroethane	<0.0005	mg/L	0.0005 / 0.0050	05/03/01	GR
Trichloroethene	<0.0005	mg/L	0.0005 / 0.0050	05/03/01	GR
Trichlorofluoromethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,2,3-Trichloropropane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Vinyl chloride	<0.0005	mg/L	0.0005 / 0.0020	05/03/01	GR
m,p-Xylenes (Note #1)	<0.0005	mg/L	0.0005 / 10	05/03/01	GR
o-Xylenes (Note #1)	<0.0005	mg/L	0.0005 / 10	05/03/01	GR
n-Butylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
sec-Butylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
tert-Butylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Hexachlorobutadiene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Isopropylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
4-Isopropyltoluene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Naphthalene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
n-Propylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,2,3-Trichlorobenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,2,4-Trimethylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,3,5-Trimethylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR

N.R = Not regulated

Note #1: DOH report format provides only one space for the PCB's and Xylenes. EQ Lab is reporting each of the Arochlors for PCB's and the individual Xylenes.
Please refer to our Laboratory Tests Results.

Note # 2: The regulated limit for Total Trihalomethanes is 0.100 mg/L and must be compara to the sum of the four Trihalomethanes indified with this note.

(8)

COMPAÑIA DE AGUAS
DE PUERTO RICO
P.O. Box 7066, Bo. Obrero Sta
San Juan, P.R. 00916

Attn: Mr. Raymond Sandza

EQ Lab. Sample Number: 139933
PRASA Sample Number: 01M0707
PWSID: 3323
Sample Description: Drinking Water - Grab
Source: Pozo Lola Rdz. De Tio 1

Page Number: 2
Date Collected: 04/26/01
Date Received: 04/27/01
Date Reported: 05/09/01

Parameter	Result	Units	MDL /MCL	Date Analyzed	Analysts
Volatiles Organic Compounds (EPA 524.2)					
trans-1,3-Dichloropropene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Ethylbenzene	<0.0005	mg/L	0.0005 / 0.70	05/03/01	GR
Styrene	<0.0005	mg/L	0.0005 / 0.10	05/03/01	GR
1,1,1,2-Tetrachloroethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,1,2,2-Tetrachloroethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Tetrachloroethene	0.0024	mg/L	0.0005 / 0.0050	05/03/01	GR
Toluene	<0.0005	mg/L	0.0005 / 1.0	05/03/01	GR
1,2,4-Trichlorobenzene	<0.0005	mg/L	0.0005 / 0.070	05/03/01	GR
1,1,1-Trichloroethane	<0.0005	mg/L	0.0005 / 0.20	05/03/01	GR
1,1,2-Trichloroethane	<0.0005	mg/L	0.0005 / 0.0050	05/03/01	GR
Trichloroethene	<0.0005	mg/L	0.0005 / 0.0050	05/03/01	GR
Trichlorofluoromethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,2,3-Trichloropropane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Vinyl chloride	<0.0005	mg/L	0.0005 / 0.0020	05/03/01	GR
m,p-Xylenes (Note #1)	<0.0005	mg/L	0.0005 / 10	05/03/01	GR
o-Xylenes (Note #1)	<0.0005	mg/L	0.0005 / 10	05/03/01	GR
n-Butylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
sec-Butylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
tert-Butylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Hexachlorobutadiene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Isopropylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
4-Isopropyltoluene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Naphthalene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
n-Propylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,2,3-Trichlorobenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,2,4-Trimethylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,3,5-Trimethylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR

N.R = Not regulated

Note #1: DOH report format provides only one space for the PCB's and Xylenes. EQ Lab is reporting each of the Arochlors for PCB's and the individual Xylenes.

Please refer to our Laboratory Tests Results.

Note # 2: The regulated limit for Total Trihalomethanes is 0.100 mg/L and must be compara to the sum of the four Trihalomethanes indified with this note.

9

COMPAÑIA DE AGUAS
DE PUERTO RICO
P.O. Box 7066, Bo. Obrero Sta
San Juan, P.R. 00916

Attn: Mr. Raymond-Sandza

ENVIRONMENTAL QUALITY LABORATORIES, INC.

EQ Lab. Sample Number: 139933
PRASA Sample Number: 01M0707
PWSID: 3323
Sample Description: Drinking Water - Grab
Source: Pozo Lola Rdz. De Tio 1

Date Collected: 04/26/01
Date Received: 04/27/01
Date Reported: 05/09/01

Parameter	Result	Units	MDL /MCL	Date Analyzed	Analysts
Volatiles Organic Compounds (EPA 524.2)					
trans-1,3-Dichloropropene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Ethylbenzene	<0.0005	mg/L	0.0005 / 0.70	05/03/01	GR
Styrene	<0.0005	mg/L	0.0005 / 0.10	05/03/01	GR
1,1,1,2-Tetrachloroethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,1,2,2-Tetrachloroethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Tetrachloroethene	0.0024	mg/L	0.0005 / 0.0050	05/03/01	GR
Toluene	<0.0005	mg/L	0.0005 / 1.0	05/03/01	GR
1,2,4-Trichlorobenzene	<0.0005	mg/L	0.0005 / 0.070	05/03/01	GR
1,1,1-Trichloroethane	<0.0005	mg/L	0.0005 / 0.20	05/03/01	GR
1,1,2-Trichloroethane	<0.0005	mg/L	0.0005 / 0.0050	05/03/01	GR
Trichloroethene	<0.0005	mg/L	0.0005 / 0.0050	05/03/01	GR
Trichlorofluoromethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,2,3-Trichloropropane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Vinyl chloride	<0.0005	mg/L	0.0005 / 0.0020	05/03/01	GR
m,p-Xylenes (Note #1)	<0.0005	mg/L	0.0005 / 10	05/03/01	GR
o-Xylenes (Note #1)	<0.0005	mg/L	0.0005 / 10	05/03/01	GR
n-Butylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
sec-Butylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
tert-Butylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Hexachlorobutadiene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Isopropylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
4-Isopropyltoluene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Naphthalene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
n-Propylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,2,3-Trichlorobenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,2,4-Trimethylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,3,5-Trimethylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR

N.R = Not regulated

Note #1: DOH report format provides only one space for the PCB's and Xylenes. EQ Lab is reporting each of the Arochlors for PCB's and the individual Xylenes.
Please refer to our Laboratory Tests Results.

Note # 2: The regulated limit for Total Trihalomethanes is 0.100 mg/L and must be compara to the sum of the four Trihalomethanes indified with this note.

ENVIRONMENTAL QUALITY LABORATORIES, INC. P.O.BOX 11456, SANTURCE, P.R. 00910-1456, TELS 725-5333, 725-3708

COMPAÑIA DE AGUAS
DE PUERTO RICO
P.O. Box 7066, Bo. Obrero Sta
San Juan, P.R. 00916

Attn: Mr. Raymond Sandza

EQ Lab. Sample Number: 139932
PRASA Sample Number: 01M0706
PWSID: 3323
Sample Description: Drinking Water - Grab
Source: Pozo Retiro

Page Number: 2
Date Collected: 04/26/01
Date Received: 04/27/01
Date Reported: 05/09/01

Parameter	Result	Units	MDL /MCL	Date Analyzed	Analysts
Volatiles Organic Compounds (EPA 524.2)					
trans-1,3-Dichloropropene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Ethylbenzene	<0.0005	mg/L	0.0005 / 0.70	05/03/01	GR
Styrene	<0.0005	mg/L	0.0005 / 0.10	05/03/01	GR
1,1,1,2-Tetrachloroethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,1,2,2-Tetrachloroethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Tetrachloroethene	0.0010	mg/L	0.0005 / 0.0050	05/03/01	GR
Toluene	<0.0005	mg/L	0.0005 / 1.0	05/03/01	GR
1,2,4-Trichlorobenzene	<0.0005	mg/L	0.0005 / 0.070	05/03/01	GR
1,1,1-Trichloroethane	<0.0005	mg/L	0.0005 / 0.20	05/03/01	GR
1,1,2-Trichloroethane	<0.0005	mg/L	0.0005 / 0.0050	05/03/01	GR
Trichloroethene	<0.0005	mg/L	0.0005 / 0.0050	05/03/01	GR
Trichlorofluoromethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,2,3-Trichloropropane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Vinyl chloride	<0.0005	mg/L	0.0005 / 0.0020	05/03/01	GR
m,p-Xylenes (Note #1)	<0.0005	mg/L	0.0005 / 10	05/03/01	GR
o-Xylenes (Note #1)	<0.0005	mg/L	0.0005 / 10	05/03/01	GR
n-Butylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
sec-Butylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
tert-Butylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Hexachlorobutadiene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Isopropylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
4-Isopropyltoluene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Naphthalene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
n-Propylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,2,3-Trichlorobenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,2,4-Trimethylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,3,5-Trimethylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR

N.R = Not regulated

Note #1: DOH report format provides only one space for the PCB's and Xylenes. EQ Lab is reporting each of the Arochlors for PCB's and the individual Xylenes.

Please refer to our Laboratory Tests Results.

Note # 2: The regulated limit for Total Trihalomethanes is 0.100 mg/L and must be compara to the sum of the four Trihalomethanes indified with this note.

11

COMPAÑIA DE AGUAS
DE PUERTO RICO
P.O. Box 7066, Bo. Obrero Sta
San Juan, P.R. 00916

Attn: Mr. Raymond Sandza

EQ Lab. Sample Number: 139932
PRASA Sample Number: 01M0706
PWSID: 3323
Sample Description: Drinking Water - Grab
Source: Pozo Retiro

Page Number: 2
Date Collected: 04/26/01
Date Received: 04/27/01
Date Reported: 05/09/01

Parameter	Result	Units	MDL /MCL	Date Analyzed	Analysts
Volatiles Organic Compounds (EPA 524.2)					
trans-1,3-Dichloropropene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Ethylbenzene	<0.0005	mg/L	0.0005 / 0.70	05/03/01	GR
Styrene	<0.0005	mg/L	0.0005 / 0.10	05/03/01	GR
1,1,1,2-Tetrachloroethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,1,2,2-Tetrachloroethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Tetrachloroethene	0.0010	mg/L	0.0005 / 0.0050	05/03/01	GR
Toluene	<0.0005	mg/L	0.0005 / 1.0	05/03/01	GR
1,2,4-Trichlorobenzene	<0.0005	mg/L	0.0005 / 0.070	05/03/01	GR
1,1,1-Trichloroethane	<0.0005	mg/L	0.0005 / 0.20	05/03/01	GR
1,1,2-Trichloroethane	<0.0005	mg/L	0.0005 / 0.0050	05/03/01	GR
Trichloroethene	<0.0005	mg/L	0.0005 / 0.0050	05/03/01	GR
Trichlorofluoromethane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,2,3-Trichloropropane	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Vinyl chloride	<0.0005	mg/L	0.0005 / 0.0020	05/03/01	GR
m,p-Xylenes (Note #1)	<0.0005	mg/L	0.0005 / 10	05/03/01	GR
o-Xylenes (Note #1)	<0.0005	mg/L	0.0005 / 10	05/03/01	GR
n-Butylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
sec-Butylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
tert-Butylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Hexachlorobutadiene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Isopropylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
4-Isopropyltoluene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
Naphthalene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
n-Propylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,2,3-Trichlorobenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,2,4-Trimethylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR
1,3,5-Trimethylbenzene	<0.0005	mg/L	0.0005 / N.R.	05/03/01	GR

N.R = Not regulated

Note #1: DOH report format provides only one space for the PCB's and Xylenes. EQ Lab is reporting each of the Arochlors for PCB's and the individual Xylenes.

Please refer to our Laboratory Tests Results.

Note # 2: The regulated limit for Total Trihalomethanes is 0.100 mg/L and must be compara to the sum of the four Trihalomethanes indified with this note.

(12)

LABORATORIO CENTRAL CAGUAS - A.A.A.
INFORME DE VOC

Region: *SUROESTE*

No.Muestra: 01-M-0719   **PWSID:** *3333*   **Fecha Informado:** 5/7/01
Fecha: 4/26/01   **Unidad_medida:** ppm
Metodo: 524.2   v = violación   * =contratada

Procedencia: *POZO MOBIL*

		Resultado mg/ L	MCL mg/ L			Resultado mg/ L	MCL mg/ L
Benceno	<	0.0005	0.005	Dibromometano	<	0.0005	
Bromobenceno	<	0.0005		1,2-Diclorobenceno	<	0.0005	0.6
Bromoclorometano	<	0.0005		1,3-Diclorobenceno	<	0.0005	
Bromometano	<	0.0005		1,4-Diclorobenceno	<	0.0005	0.075
N-butilbenceno	<	0.0005		Diclorodifluorometano	<	0.0005	
Sec-butilbenceno	<	0.0005		1,1-Dicloroetano	<	0.0005	
Tert-butilbenceno	<	0.0005		1,2-Dicloroetano	<	0.0005	0.005
Tetracloruro carbono	<	0.0005	0.005	1,1-Dicloroeteno	<	0.0005	0.007
Clorobenceno	<	0.0005	0.1	Cis-1,2-Dicloroeteno		0.00051	0.07
Cloroetano	<	0.0005		Trans-1,2-Dicloroeteno	<	0.0005	0.1
Clorometano	<	0.0005		1,2-Dicloropropan	<	0.0005	[illegible]
2-Clorotolueno	<	0.0005		1,3-Dicloropropano	<	0.0005	
4-Clorotolueno	<	0.0005		2,2-Dicloropropano	<	0.0005	
Tetracloroeteno		0.0020	0.005	1,1-Dicloropropeno	<	0.0005	
Tolueno	<	0.0005	1.0	Etilbenceno	<	0.0005	0.7
1,2,3-Triclorobenceno	<	0.0005		Hexaclorobutadileno	<	0.0005	
1,2,4-Triclorobenceno	<	0.0005	0.07	Isopropilbenceno	<	0.0005	
1,1,1-Tricloroetano	<	0.0005	0.2	p-Isopropilbenceno	<	0.0005	
1,1,2-Tricloroetano	<	0.0005	0.005	p-Isopropiltolueno	<	0.0005	
Tricloroeteno	<	0.0005	0.005	Naftaleno	<	0.0005	
Triclorofluorometano	<	0.0005		N-propilbenceno	<	0.0005	
1,2,3-Tricloropropano	<	0.0005		Estireno	<	0.0005	0.1
1,2,4-Trimetilbenceno	<	0.0005		Diclorometano	<	0.0005	0.005
1,3,5-Trimetilbenceno	<	0.0005		1,1,1,2-Tetracloroetano	<	0.0005	
Cloruro de vinilo	<	0.0005	0.002	1,1,2,2-Tetracloroetano	<	0.0005	
Xileno total	<	0.0005	10	Cis-1,3-Dicloropropeno	<	0.0005	
				Trans-1,3-Dicloropropeno	<	0.0005	

ESTADO LIBRE ASOCIADO DE PUERTO RICO
LUZ A. ORTIZ
Lic. 3135
Químico

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Luis E. Berrios Aguiló
Lic. 2402
QUÍMICO LICENCIADO
Supervisor Depto. Orgánico

LABORATORIO CENTRAL CAGUAS - A.A.A.
INFORME DE VOC

Region: *SUROESTE*
PWSID: *3323*

No.Muestra: 01-M-0720
Fecha: 4/26/01
Metodo: 524.2

Fecha informado: 5/7/01
Unidad_medida: ppm
v = violación * = contratada

Procedencia: *POZO RETIRO*

		Resultado mg/ L	MCL mg/ L			Resultado mg/ L	MCL mg/ L
Benceno	<	0.0005	0.005	Dibromometano	<	0.0005	
Bromobenceno	<	0.0005		1,2-Diclorobenceno	<	0.0005	0.6
Bromoclorometano	<	0.0005		1,3-Diclorobenceno	<	0.0005	
Bromometano	<	0.0005		1,4-Diclorobenceno	<	0.0005	0.075
N-butilbenceno	<	0.0005		Diclorodifluorometano	<	0.0005	
Sec-butilbenceno	<	0.0005		1,1-Dicloroetano	<	0.0005	
Tert-butilbenceno	<	0.0005		1,2-Dicloroetano	<	0.0005	0.005
Tetracloruro carbono	<	0.0005	0.005	1,1-Dicloroeteno	<	0.0005	0.007
Clorobenceno	<	0.0005	0.1	Cis-1,2-Dicloroeteno	<	0.0005	0.07
Cloroetano	<	0.0005		Trans-1,2-Dicloroeteno	<	0.0005	0.1
Clorometano	<	0.0005		1,2-Dicloropropan	<	0.0005	0.005
2-Clorotolueno	<	0.0005		1,3-Dicloropropano	<	0.0005	
4-Clorotolueno	<	0.0005		2,2-Dicloropropano	<	0.0005	
Tetracloroeteno		0.0008	0.005	1,1-Dicloropropeno	<	0.0005	
Tolueno	<	0.0005	1.0	Etilbenceno	<	0.0005	0.7
1,2,3-Triclorobenceno	<	0.0005		Hexaclorobutadileno	<	0.0005	
1,2,4-Triclorobenceno	<	0.0005	0.07	Isopropilbenceno	<	0.0005	
1,1,1-Tricloroetano	<	0.0005	0.2	p-Isopropilbenceno	<	0.0005	
1,1,2-Tricloroetano	<	0.0005	0.005	p-Isopropiltolueno	<	0.0005	
Tricloroeteno	<	0.0005	0.005	Naftaleno	<	0.0005	
Triclorofluorometano	<	0.0005		N-propilbenceno	<	0.0005	
1,2,3-Tricloropropano	<	0.0005		Estireno	<	0.0005	0.1
1,2,4-Trimetilbenceno	<	0.0005		Diclorometano	<	0.0005	0.005
1,3,5-Trimetilbenceno	<	0.0005		1,1,1,2-Tetracloroetano	<	0.0005	
Cloruro de vinilo	<	0.0005	0.002	1,1,2,2-Tetracloroetano	<	0.0005	
Xileno total	<	0.0005	10	Cis-1,3-Dicloropropeno	<	0.0005	
				Trans-1,3-Dicloropropeno	<	0.0005	

ESTADO LIBRE ASOCIADO DE PUERTO RICO
LUZ A. ORTIZ
Lic. 3135
QUIMICO LICENCIADO

Químico

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Luis E. Berrios Aguiló
Lic. 2402
QUIMICO LICENCIADO

Supervisor Depto. Orgánico

LABORATORIO CENTRAL CAGUAS - A.A.A.
INFORME DE VOC

Region: *SUROESTE*

No.Muestra: 01-M-0721 **PWSID:** *3323* **Fecha Informado:** 5/7/01

Fecha: 4/26/01 **Unidad_medida:** ppm

Metodo: 524.2 v = violación * = contratada

Procedencia: *POZO LOLA RODRIGUEZ #1*

		Resultado mg/ L	MCL mg/ L			Resultado mg/ L	MCL mg/ L
Benceno	<	0.0005	0.005	Dibromometano	<	0.0005	
Bromobenceno	<	0.0005		1,2-Diclorobenceno	<	0.0005	0.6
Bromoclorometano	<	0.0005		1,3-Diclorobenceno	<	0.0005	
Bromometano	<	0.0005		1,4-Diclorobenceno	<	0.0005	0.075
N-butilbenceno	<	0.0005		Diclorodifluorometano	<	0.0005	
Sec-butilbenceno	<	0.0005		1,1-Dicloroetano	<	0.0005	
Tert-butilbenceno	<	0.0005		1,2-Dicloroetano	<	0.0005	0.005
Tetracloruro carbono	<	0.0005	0.005	1,1-Dicloroeteno	<	0.0005	0.007
Clorobenceno	<	0.0005	0.1	Cis-1,2-Dicloroeteno		0.00047	0.07
Cloroetano	<	0.0005		Trans-1,2-Dicloroeteno	<	0.0005	0.1
Clorometano	<	0.0005		1,2-Dicloropropan	<	0.0005	0.005
2-Clorotolueno	<	0.0005		1,3-Dicloropropano	<	0.0005	
4-Clorotolueno	<	0.0005		2,2-Dicloropropano	<	0.0005	
Tetracloroeteno		0.0021	0.005	1,1-Dicloropropeno	<	0.0005	
Tolueno	<	0.0005	1.0	Etilbenceno	<	0.0005	0.7
1,2,3-Triclorobenceno	<	0.0005		Hexaclorobutadileno	<	0.0005	
1,2,4-Triclorobenceno	<	0.0005	0.07	Isopropilbenceno	<	0.0005	
1,1,1-Tricloroetano	<	0.0005	0.2	p-Isopropilbenceno	<	0.0005	
1,1,2-Tricloroetano	<	0.0005	0.005	p-Isopropiltolueno	<	0.0005	
Tricloroeteno	<	0.0005	0.005	Naftaleno	<	0.0005	
Triclorofluorometano	<	0.0005		N-propilbenceno	<	0.0005	
1,2,3-Tricloropropano	<	0.0005		Estireno	<	0.0005	0.1
1,2,4-Trimetilbenceno	<	0.0005		Diclorometano	<	0.0005	0.005
1,3,5-Trimetilbenceno	<	0.0005		1,1,1,2-Tetracloroetano	<	0.0005	
Cloruro de vinilo	<	0.0005	0.002	1,1,2,2-Tetracloroetano	<	0.0005	
Xileno total	<	0.0005	10	Cis-1,3-Dicloropropeno	<	0.0005	
				Trans-1,3-Dicloropropeno	<	0.0005	

ESTADO LIBRE ASOCIADO DE PUERTO RICO
LUZ A. ORTIZ
Lic. 3135
QUIMICO LICENCIADO

Químico

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Luis E.
Berrios Aguiló
Lic. 2402
QUIMICO LICENCIADO

Supervisor Depto. Orgánico

15

LABORATORIO CENTRAL CAGUAS - A.A.A.

INFORME DE VOC

RegIon: *SUROESTE*

ero Muestra 02-M-0271 **PWSID:** *3323* **Fecha Informado:** 2/1/02

Fecha: 1/23/02 **Unidad_medida:** ppm

Metodo: 502.2 v = violación * = contratada

Procedencia: *POZO LOLA RODRIGUEZ DE TIO I*

		Resultado mg/ L		MCL mg/ L			Resultado mg/ L	MCL mg/ L
Benceno	<	0.0005		0.005	1,2-Diclorobenceno	<	0.0005	0.6
Tetracloruro de carbono	<	0.0005		0.005	1,4-Diclorobenceno	<	0.0005	0.075
Clorobenceno	<	0.0005		0.1	1,2-Dicloroetano	<	0.0005	0.005
Tetracloroeteno		0.0064	v	0.005	1,1-Dicloroeteno	<	0.0005	0.007
Tolueno	<	0.0005		1.0	Cis-1,2-Dicloroeteno		0.0006	0.07
1,2,4-Triclorobenceno	<	0.0005		0.07	Trans-1,2-Dicloroeteno	<	0.0005	0.1
1,1,1-Tricloroetano	<	0.0005		0.2	1,2-Dicloropropano	<	0.0005	0.005
1,1,2-Tricloroetano	<	0.0005		0.005	Etilbenceno	<	0.0005	0.7
Tricloroeteno	<	0.0005		0.005	Estireno	<	0.0005	0.1
Cloruro de vinilo	<	0.0005		0.002	Diclorometano	<	0.0005	0.005
Xileno total	<	0.0005		10				

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Catherine Linares Flores
Lic.# 3753
QUIMICO LICENCIADO

Químico

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Luis E. Berrios Aguiló
Lic. 2402
QUIMICO LICENCIADO

Supervisor Dpto. Orgánico

LABORATORIO CENTRAL CAGUAS - A.A.A.

INFORME DE VOC

Region: *SUROESTE*

ero Muestra 02-M-0342 PWSID: *3323* Fecha Informado: 2/1/02

Fecha: 1/29/02 Unidad_medida: ppm

Metodo: 502.2 v = violación * = contratada

Procedencia: *POZO LOLA RODRIGUEZ DE TIO 2*

		Resultado mg/ L		MCL mg/ L
Benceno	<	0.0005		0.005
Tetracloruro de carbono	<	0.0005		0.005
Clorobenceno	<	0.0005		0.1
Tetracloroeteno		0.0062	v	0.005
Tolueno	<	0.0005		1.0
1,2,4-Triclorobenceno	<	0.0005		0.07
1,1,1-Tricloroetano	<	0.0005		0.2
1,1,2-Tricloroetano	<	0.0005		0.005
Tricloroeteno	<	0.0005		0.005
Cloruro de vinilo	<	0.0005		0.002
Xileno total	<	0.0005		10

		Resultado mg/ L	MCL mg/ L
1,2-Diclorobenceno	<	0.0005	0.6
1,4-Diclorobenceno	<	0.0005	0.075
1,2-Dicloroetano	<	0.0005	0.005
1,1-Dicloroeteno	<	0.0005	0.007
Cis-1,2-Dicloroeteno		0.0007	0.07
Trans-1,2-Dicloroeteno	<	0.0005	0.1
1,2-Dicloropropano	<	0.0005	0.005
Etilbenceno	<	0.0005	0.7
Estireno	<	0.0005	0.1
Diclorometano	<	0.0005	0.005

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Catherine Linares Flores Lic.# 3753
QUIMICO LICENCIADO

Quimico

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Luis E. Berrios Aguiló Lic. 2402
QUIMICO LICENCIADO

Supervisor Depto. Organico

LABORATORIO CENTRAL CAGUAS - A.A.A.

INFORME DE VOC

Número Muestra : 02-M-1987

Fecha Muestreo : 7/23/02

Fecha Análisis : 7/28/02

Fecha Informe : 8/1/02

Región : *SUROESTE*

PWSID : *3323*

Método : 502.2

v = violación * = contratada

Procedencia : POZO LOLA RODRIGUEZ DE TIO 1

Parámetros	Resultado mg/L	MCL mg/L	Parámetros	Resultado mg/L	MCL mg/L
Benceno	< 0.0005	0.005	1,2-Diclorobenceno	< 0.0005	0.6
Tetracloruro de carbono	< 0.0005	0.005	1,4-Diclorobenceno	< 0.0005	0.075
Clorobenceno	< 0.0005	0.1	1,2-Dicloroetano	< 0.0005	0.005
Tetracloroeteno	0.0017	0.005	1,1-Dicloroeteno	< 0.0005	0.007
Tolueno	< 0.0005	1.0	Cis-1,2-Dicloroeteno	< 0.0005	0.07
1,2,4-Triclorobenceno	< 0.0005	0.07	Trans-1,2-Dicloroeteno	< 0.0005	0.1
1,1,1-Tricloroetano	< 0.0005	0.2	1,2-Dicloropropano	< 0.0005	0.005
1,1,2-Tricloroetano	< 0.0005	0.005	Etilbenceno	< 0.0005	0.7
Tricloroeteno	< 0.0005	0.005	Estireno	< 0.0005	0.1
Cloruro de vinilo	< 0.0005	0.002	Diclorometano	< 0.0005	0.005
Xileno total	< 0.0005	10			

Comentarios:

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Catherine
Linares Flores
Lic.# 3753
QUIMICO LICENCIADO

Analista

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Luis E.
Berrios Aguiló
Lic. 2402
QUIMICO LICENCIADO

Supervisor Depto. Orgánicos

LABORATORIO CENTRAL CAGUAS - A.A.A.

INFORME DE VOC

Número Muestra : 02-M-2120
Fecha Muestreo : 7/29/02
Fecha Análisis : 7/31/02
Fecha Informe : 8/7/02

Región : *SUROESTE*
PWSID : *3323*
Método : 502.2
v = violación   *** = contratada**

Procedencia : POZO RETIRO

Parámetros	Resultado mg/L	MCL mg/L	Parámetros	Resultado mg/L	MCL mg/L
Benceno	< 0.0005	0.005	1,2-Diclorobenceno	< 0.0005	0.6
Tetracloruro de carbono	< 0.0005	0.005	1,4-Diclorobenceno	< 0.0005	0.075
Clorobenceno	< 0.0005	0.1	1,2-Dicloroetano	< 0.0005	0.005
Tetracloroeteno	0.0014	0.005	1,1-Dicloroeteno	< 0.0005	0.007
Tolueno	< 0.0005	1.0	Cis-1,2-Dicloroeteno	< 0.0005	0.07
1,2,4-Triclorobenceno	< 0.0005	0.07	Trans-1,2-Dicloroeteno	< 0.0005	0.1
1,1,1-Tricloroetano	< 0.0005	0.2	1,2-Dicloropropano	< 0.0005	0.005
1,1,2-Tricloroetano	< 0.0005	0.005	Etilbenceno	< 0.0005	0.7
Tricloroeteno	< 0.0005	0.005	Estireno	< 0.0005	0.1
Cloruro de vinilo	< 0.0005	0.002	Diclorometano	< 0.0005	0.005
Xileno total	< 0.0005	10			

Comentarios:

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Catherine Linares Flores
Lic.# 3753
QUIMICO LICENCIADO

Analista

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Luis E. Berrios Aguiló
Lic. 2402
QUIMICO LICENCIADO

Supervisor Depto. Orgánicos

LABORATORIO CENTRAL CAGUAS - A.A.A.

INFORMES DE ORGANICOS

Pagina 1
09/01/03

No.Muestra: 02-M-2999
Fecha: 26/12/02
Hora: 05:15
Analista: LAO

Fecha Analisis
04/01/03

PWSID: *3323*
Region: *MAYAGUEZ*
Sistema: SAN GERMAN URBANO
Municipio: SAN GERMAN

Procedencia: *POZO LOLA RODRIGUEZ DE TIO II*
Direccion: *CALLE DR. VEVE (LADO ESCUELA)*

Método	Parámetro	Resultado	Unidades	MDL	MCL
502.2	Benceno	<0.0005	mg/L	0.0005	0.005
502.2	Tetracloruro de Carbono	<0.0005	mg/L	0.0005	0.005
502.2	Clorobenceno	<0.0005	mg/L	0.0005	0.1
502.2	Tetracloroeteno	0.0042	mg/L	0.0005	0.005
502.2	Tolueno	<0.0005	mg/L	0.0005	1
502.2	1,2,4 - Triclorobenceno	<0.0005	mg/L	0.0005	0.07
502.2	1,1,1 - Tricloroetano	<0.0005	mg/L	0.0005	0.2
502.2	1,1,2 - Tricloroetano	<0.0005	mg/L	0.0005	0.005
502.2	Tricloroeteno	<0.0005	mg/L	0.0005	0.005
502.2	Clororuro de Vinilo	<0.0005	mg/L	0.0005	0.002
502.2	Xileno Total	<0.0005	mg/L	0.0005	10
502.2	1,2 - Diclorobenceno	<0.0005	mg/L	0.0005	0.6
502.2	1,4 - Diclorobenceno	<0.0005	mg/L	0.0005	0.075
502.2	1,2 - Dicloroetano	<0.0005	mg/L	0.0005	0.005
502.2	1,1 - Dicloroeteno	<0.0005	mg/L	0.0005	0.007
502.2	Cis - 1,2 - Dicloroeteno	<0.0005	mg/L	0.0005	0.07
502.2	Trans - 1,2 - Dicloroeteno	<0.0005	mg/L	0.0005	0.1
502.2	1,2 - Dicloropropano	<0.0005	mg/L	0.0005	0.005
502.2	Etilbenceno	<0.0005	mg/L	0.0005	0.7
502.2	Estireno	<0.0005	mg/L	0.0005	0.1
502.2	Diclorometano	<0.0005	mg/L	0.0005	0.005

ESTADO LIBRE ASOCIADO DE PUERTO RICO
LUZ A. ORTIZ
Lic. 3135
Químico

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Luis E. Berríos Aguiló
Lic. 2402
QUÍMICO LICENCIADO
Supervisor Depto. Orgánico

LABORATORIO CENTRAL CAGUAS - A.A.A.

Pagina 1
1/10/03

INFORMES DE ORGANICOS

No.Muestra: 02-M-2998
Fecha: 12/26/02
Hora: 5:40 PM
Analista: LAO

Fecha Analisis
1/4/03

PWSID: *3323*
Region: *MAYAGUEZ*
Sistema: SAN GERMAN URBANO
Municipio: SAN GERMAN

Procedencia: *POZO LOLA RODRIGUEZ DE TIO I*
Direccion: *AVE. CASTRO PEREZ*
CENTRO GUBERNAMENTAL

Método	Parámetro	Resultado	Unidades	MDL	MCL
502.2	Benceno	<0.0005	mg/L	0.0005	0.005
502.2	Tetracloruro de Carbono	<0.0005	mg/L	0.0005	0.005
502.2	Clorobenceno	<0.0005	mg/L	0.0005	0.1
502.2	Tetracloroeteno	0.0042	mg/L	0.0005	0.005
502.2	Tolueno	<0.0005	mg/L	0.0005	1
502.2	1,2,4 - Triclorobenceno	<0.0005	mg/L	0.0005	0.07
502.2	1,1,1 - Tricloroetano	<0.0005	mg/L	0.0005	0.2
502.2	1,1,2 - Tricloroetano	<0.0005	mg/L	0.0005	0.005
502.2	Tricloroeteno	<0.0005	mg/L	0.0005	0.005
502.2	Clororuro de Vinilo	<0.0005	mg/L	0.0005	0.002
502.2	Xileno Total	<0.0005	mg/L	0.0005	10
502.2	1,2 - Diclorobenceno	<0.0005	mg/L	0.0005	0.6
502.2	1,4 - Diclorobenceno	<0.0005	mg/L	0.0005	0.075
502.2	1,2 - Dicloroetano	<0.0005	mg/L	0.0005	0.005
502.2	1,1 - Dicloroeteno	<0.0005	mg/L	0.0005	0.007
502.2	Cis - 1,2 - Dicloroeteno	0.0005	mg/L	0.0005	0.07
502.2	Trans - 1,2 - Dicloroeteno	<0.0005	mg/L	0.0005	0.1
502.2	1,2 - Dicloropropano	<0.0005	mg/L	0.0005	0.005
502.2	Etilbenceno	<0.0005	mg/L	0.0005	0.7
502.2	Estireno	<0.0005	mg/L	0.0005	0.1
502.2	Diclorometano	<0.0005	mg/L	0.0005	0.005

ESTADO LIBRE ASOCIADO DE PUERTO RICO
LUZ A. ORTIZ
Lic. 3135
QUIMICO LICENCIADO

Químico

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Luis E. Berrios Aguiló
Lic. 2402
QUIMICO LICENCIADO

Supervisor Depto. Orgánico

21

~~000211~~

LABORATORIO CENTRAL CAGUAS - A.A.A.

INFORMES DE ORGANICOS

Pagina 1
1/10/03

No.Muestra: 02-M-3000
Fecha: 12/26/02
Hora: 5:50 PM
Analista: LAO

Fecha Analisis
1/4/03

PWSID: *3323*
Region: *MAYAGUEZ*
Sistema: SAN GERMAN URBANO
Municipio: SAN GERMAN

Procedencia: *POZO RETIRO*
Direccion: *AVE. CASTRO PEREZ*

Método	Parámetro	Resultado	Unidades	MDL	MCL
502.2	Benceno	<0.0005	mg/L	0.0005	0.005
502.2	Tetracloruro de Carbono	<0.0005	mg/L	0.0005	0.005
502.2	Clorobenceno	<0.0005	mg/L	0.0005	0.1
502.2	Tetracloroeteno	0.001	mg/L	0.0005	0.005
502.2	Tolueno	<0.0005	mg/L	0.0005	1
502.2	1,2,4 - Triclorobenceno	<0.0005	mg/L	0.0005	0.07
502.2	1,1,1 - Tricloroetano	<0.0005	mg/L	0.0005	0.2
502.2	1,1,2 - Tricloroetano	<0.0005	mg/L	0.0005	0.005
502.2	Tricloroeteno	<0.0005	mg/L	0.0005	0.005
502.2	Clororuro de Vinilo	<0.0005	mg/L	0.0005	0.002
502.2	Xileno Total	<0.0005	mg/L	0.0005	10
502.2	1,2 - Diclorobenceno	<0.0005	mg/L	0.0005	0.6
502.2	1,4 - Diclorobenceno	<0.0005	mg/L	0.0005	0.075
502.2	1,2 - Dicloroetano	<0.0005	mg/L	0.0005	0.005
502.2	1,1 - Dicloroeteno	<0.0005	mg/L	0.0005	0.007
502.2	Cis - 1,2 - Dicloroeteno	<0.0005	mg/L	0.0005	0.07
502.2	Trans - 1,2 - Dicloroeteno	<0.0005	mg/L	0.0005	0.1
502.2	1,2 - Dicloropropano	<0.0005	mg/L	0.0005	0.005
502.2	Etilbenceno	<0.0005	mg/L	0.0005	0.7
502.2	Estireno	<0.0005	mg/L	0.0005	0.1
502.2	Diclorometano	<0.0005	mg/L	0.0005	0.005

ESTADO LIBRE ASOCIADO DE PUERTO RICO
LUZ A. ORTIZ
QUIMICO LICENCIADO

Químico

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Luis E. Berrios Aguiló
Lic. 2402
QUIMICO LICENCIADO

Supervisor Depto. Orgánico

22

000212

LABORATORIO CENTRAL CAGUAS - A.A.A.
INFORMES DE ORGANICOS

No.Muestra: 03-M-0212 PWSID: *3323*
Fecha: 1/24/03 Fecha Analisis 2/3/03 Region: *MAYAGUEZ*
Hora: 10:15 AM Sistema: SAN GERMAN URBANO
Analista: LAO Municipio: SAN GERMAN

Procedencia: *POZO RETIRO*
Direccion: *AVE. CASTRO PEREZ*

Método	Parámetro	Resultado	Unidades	MDL	MCL
502.2	Benceno	<0.0005	mg/L	0.0005	0.005
502.2	Tetracloruro de Carbono	<0.0005	mg/L	0.0005	0.005
502.2	Clorobenceno	<0.0005	mg/L	0.0005	0.1
502.2	Tetracloroeteno	0.0011	mg/L	0.0005	0.005
502.2	Tolueno	<0.0005	mg/L	0.0005	1
502.2	1,2,4 - Triclorobenceno	<0.0005	mg/L	0.0005	0.07
502.2	1,1,1 - Tricloroetano	<0.0005	mg/L	0.0005	0.2
502.2	1,1,2 - Tricloroetano	<0.0005	mg/L	0.0005	0.005
502.2	Tricloroeteno	<0.0005	mg/L	0.0005	0.005
502.2	Clororuro de Vinilo	<0.0005	mg/L	0.0005	0.002
502.2	Xileno Total	<0.0005	mg/L	0.0005	10
502.2	1,2 - Diclorobenceno	<0.0005	mg/L	0.0005	0.6
502.2	1,4 - Diclorobenceno	<0.0005	mg/L	0.0005	0.075
502.2	1,2 - Dicloroetano	<0.0005	mg/L	0.0005	0.005
502.2	1,1 - Dicloroeteno	<0.0005	mg/L	0.0005	0.007
502.2	Cis - 1,2 - Dicloroeteno	<0.0005	mg/L	0.0005	0.07
502.2	Trans - 1,2 - Dicloroeteno	<0.0005	mg/L	0.0005	0.1
502.2	1,2 - Dicloropropano	<0.0005	mg/L	0.0005	0.005
502.2	Etilbenceno	<0.0005	mg/L	0.0005	0.7
502.2	Estireno	<0.0005	mg/L	0.0005	0.1
502.2	Diclorometano	<0.0005	mg/L	0.0005	0.005

ESTADO LIBRE ASOCIADO DE PUERTO RICO
LUZ A. ORTIZ
LIC. 6135
QUIMICO LICENCIADO

Quimico

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Luis E. Berrios Aguiló
Lic. 2402
QUIMICO LICENCIADO

Supervisor Depto. Organico

LABORATORIO CENTRAL CAGUAS - A.A.A.

INFORMES DE ORGANICOS

No.Muestra: 03-M-0214
Fecha: 24/01/03
Hora: 11:00
Analista: LAO

Fecha Analisis
03/02/03

PWSID: *3323*
Region: *MAYAGUEZ*
Sistema: SAN GERMAN URBANO
Municipio: SAN GERMAN

Procedencia: *POZO LOLA RODRIGUEZ DE TIO I*
Direccion: *AVE. CASTRO PEREZ*
CENTRO GUBERNAMENTAL

Método	Parámetro	Resultado	Unidades	MDL	MCL
502.2	Benceno	<0.0005	mg/L	0.0005	0.005
502.2	Tetracloruro de Carbono	<0.0005	mg/L	0.0005	0.005
502.2	Clorobenceno	<0.0005	mg/L	0.0005	0.1
502.2	Tetracloroeteno	0.0013	mg/L	0.0005	0.005
502.2	Tolueno	<0.0005	mg/L	0.0005	1
502.2	1,2,4 - Triclorobenceno	<0.0005	mg/L	0.0005	0.07
502.2	1,1,1 - Tricloroetano	<0.0005	mg/L	0.0005	0.2
502.2	1,1,2 - Tricloroetano	<0.0005	mg/L	0.0005	0.005
502.2	Tricloroeteno	<0.0005	mg/L	0.0005	0.005
502.2	Clororuro de Vinilo	<0.0005	mg/L	0.0005	0.002
502.2	Xileno Total	<0.0005	mg/L	0.0005	10
502.2	1,2 - Diclorobenceno	<0.0005	mg/L	0.0005	0.6
502.2	1,4 - Diclorobenceno	<0.0005	mg/L	0.0005	0.075
502.2	1,2 - Dicloroetano	<0.0005	mg/L	0.0005	0.005
502.2	1,1 - Dicloroeteno	<0.0005	mg/L	0.0005	0.007
502.2	Cis - 1,2 - Dicloroeteno	<0.0005	mg/L	0.0005	0.07
502.2	Trans - 1,2 - Dicloroeteno	<0.0005	mg/L	0.0005	0.1
502.2	1,2 - Dicloropropano	<0.0005	mg/L	0.0005	0.005
502.2	Etilbenceno	<0.0005	mg/L	0.0005	0.7
502.2	Estireno	<0.0005	mg/L	0.0005	0.1
502.2	Diclorometano	<0.0005	mg/L	0.0005	0.005

ESTADO LIBRE ASOCIADO DE PUERTO RICO
LUZ A. ORTIZ
Lic. 2106
QUIMICO LICENCIADO
Quimico

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Luis R. Berrios Aguiló
Lic. 2402
QUIMICO LICENCIADO
Supervisor Depto. Orgánico

(24)

~~000234~~

Autoridad Acueductos Alcantarillados - Ondeo de P.R.
Laboratorio Central Caguas
P.O. Box 5789, Caguas, P.R. 00726
Tel. 787-746-1925 Fax 787-746-4707

INFORME DE ANALISIS DE AGUA POTABLE

Análisis: VOC's Regulados

No.Muestra: 03-M-1099
Fecha Muestra: 5/5/03
Hora Muestra: 6:30 PM
Fecha Analisis: 5/10/03
Analista: EMS
Fecha Informe: 5/30/03

PWSID: 3323
Region: MAYAGUEZ
Sistema: SAN GERMAN URB
Municipio: SAN GERMAN
Requerida por: Depto. de Salud
Dirección: San Juan PR

I.D. Punto: *POZO LOLA RODRIGUEZ DE TIO I*
Direccion: *AVE. CASTRO PEREZ*
CENTRO GUBERNAMENTAL

Método EPA	Parámetro	Resultado	Unidades	MDL	MCL
502.2	Benceno	<0.0005	mg/L	0.0005	0.005
502.2	Tetracloruro de Carbono	<0.0005	mg/L	0.0005	0.005
502.2	Clorobenceno	<0.0005	mg/L	0.0005	0.1
502.2	Tetracloroeteno	0.0011	mg/L	0.0005	0.005
502.2	Tolueno	<0.0005	mg/L	0.0005	1
502.2	1,2,4 - Triclorobenceno	<0.0005	mg/L	0.0005	0.07
502.2	1,1,1 - Tricloroetano	<0.0005	mg/L	0.0005	0.2
502.2	1,1,2 - Tricloroetano	<0.0005	mg/L	0.0005	0.005
502.2	Tricloroeteno	<0.0005	mg/L	0.0005	0.005
502.2	Clororuro de Vinilo	<0.0005	mg/L	0.0005	0.002
502.2	Xileno Total	<0.0005	mg/L	0.0005	10
502.2	1,2 - Diclorobenceno	<0.0005	mg/L	0.0005	0.6
502.2	1,4 - Diclorobenceno	<0.0005	mg/L	0.0005	0.075
502.2	1,2 - Dicloroetano	<0.0005	mg/L	0.0005	0.005
502.2	1,1 - Dicloroeteno	<0.0005	mg/L	0.0005	0.007
502.2	Cis - 1,2 - Dicloroeteno	<0.0005	mg/L	0.0005	0.07
502.2	Trans - 1,2 - Dicloroeteno	<0.0005	mg/L	0.0005	0.1
502.2	1,2 - Dicloropropano	<0.0005	mg/L	0.0005	0.005
502.2	Etilbenceno	<0.0005	mg/L	0.0005	0.7
502.2	Estireno	<0.0005	mg/L	0.0005	0.1
502.2	Diclorometano	<0.0005	mg/L	0.0005	0.005

Comentarios:

Químico I
Nombre / Título

Firma

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Luis E. Berrios Aguiló
Lic. 2402
QUÍMICO LICENCIADO

Nombre / Título

Firma

Nota: El resultado de este análisis se refiere exclusivamante a la muestra analizada.
Este informe solo puede ser reproducido en forma completa y con autorización escrita del Laboratorio Central Caguas.

ONDEO DE PUERTO RICO

Laboratorio Central Caguas
P.O. Box 5789, Caguas, P.R. 00726
Tel. 787-746-1925 Fax 787-745-4707

INFORME DE ANALISIS DE AGUA POTABLE

Análisis: VOC's Regulados

No.Muestra: 03-M-1798
Fecha Muestra: 6/29/03
Hora Muestra: 9:20 AM
Fecha Analisis: 7/3/03
Analista: EMS
Fecha Informe: 7/10/03

I.D. Punto: *POZO RETIRO*
Direccion: *AVE. CASTRO PEREZ*

PWSID: 3323
Region: MAYAGUEZ
Sistema: SAN GERMAN URB
Municipio: SAN GERMAN
Requerida por: Depto. de Salud
Dirección: San Juan PR

Método EPA	Parámetro	Resultado	Unidades	MDL	MCL
502.2	Benceno	<0.0005	mg/L	0.0005	0.005
502.2	Tetracloruro de Carbono	<0.0005	mg/L	0.0005	0.005
502.2	Clorobenceno	<0.0005	mg/L	0.0005	0.1
502.2	Tetracloroeteno	0.0006	mg/L	0.0005	0.005
502.2	Tolueno	<0.0005	mg/L	0.0005	1
502.2	1,2,4 - Triclorobenceno	<0.0005	mg/L	0.0005	0.07
502.2	1,1,1 - Tricloroetano	<0.0005	mg/L	0.0005	0.2
502.2	1,1,2 - Tricloroetano	<0.0005	mg/L	0.0005	0.005
502.2	Tricloroeteno	<0.0005	mg/L	0.0005	0.005
502.2	Clororuro de Vinilo	<0.0005	mg/L	0.0005	0.002
502.2	Xileno Total	<0.0005	mg/L	0.0005	10
502.2	1,2 - Diclorobenceno	<0.0005	mg/L	0.0005	0.6
502.2	1,4 - Diclorobenceno	<0.0005	mg/L	0.0005	0.075
502.2	1,2 - Dicloroetano	<0.0005	mg/L	0.0005	0.005
502.2	1,1 - Dicloroeteno	<0.0005	mg/L	0.0005	0.007
502.2	Cis - 1,2 - Dicloroeteno	0.0012	mg/L	0.0005	0.07
502.2	Trans - 1,2 - Dicloroeteno	<0.0005	mg/L	0.0005	0.1
502.2	1,2 - Dicloropropano	<0.0005	mg/L	0.0005	0.005
502.2	Etilbenceno	<0.0005	mg/L	0.0005	0.7
502.2	Estireno	<0.0005	mg/L	0.0005	0.1
502.2	Diclorometano	<0.0005	mg/L	0.0005	0.005

Comentarios:

Químico I
Nombre / Titulo

Firma

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Luis F. Berrios Aguiló
Lic. 2402
QUIMICO LICENCIADO

Nombre / Titulo

Firma

26

000449

To: ONDEO DE PUERTO RICO
P.O. BOX 5789
CAGUAS PR 00726

eqlab ENVIRONMENTAL QUALITY LABORATORIES, INC

Attn:	LCDO. JORGE FLECHAS
Source:	POZO LOLA 1
Project Name:	PRDOH
Facility:	CAGUAS CENTRAL LABORATORY
Description:	DRINKING WATER - Grab
Client Ref. #:	03M2679
PWSID:	3323

Laboratory Test Report

Sample Number:	446254	Collected Date & Time:	09/25/2003	10:10	Date of Report:	10/09/2003
Work Order:	1455-01-01	Received Date & Time:	09/29/2003	13:25	Collected By:	D.ROSSY
Delivery Slip:	2003-07734	Temperature at Arrival:	3 °C		Eqlab Rep.:	JFUENTES
Folder Number:	40327				Proposal Number:	3988 - 1

Remarks:

27

Parameter	Method	Results	Units	Limits LOD	Limits MCL	Analysis Date	Analysis Time	Analysis By	Prep Method Date	Prep Method By	Prep Method Method
Chloroethane	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	00:52	JHERNAN	--	--	N/A
Chloroform	EPA 524.2	0.0009	mg/L	0.000500	--	10/06/2003	00:52	JHERNAN	--	--	N/A
Chloromethane	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	00:52	JHERNAN	--	--	N/A
cis-1,2-Dichloroethene	EPA 524.2	ND	mg/L	0.000500	0.070	10/06/2003	00:52	JHERNAN	--	--	N/A
cis-1,3-Dichloropropene	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	00:52	JHERNAN	--	--	N/A
Dibromochloromethane	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	00:52	JHERNAN	--	--	N/A
Dibromomethane	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	00:52	JHERNAN	--	--	N/A
Dichlorodifluoromethane	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	00:52	JHERNAN	--	--	N/A
Dichloromethane	EPA 524.2	ND	mg/L	0.000500	0.005	10/06/2003	00:52	JHERNAN	--	--	N/A
Epichlorohydrin	EPA 524.2	ND	mg/L	0.0500	--	10/06/2003	00:52	JHERNAN	--	--	N/A
Ethylbenzene	EPA 524.2	ND	mg/L	0.000500	0.700	10/06/2003	00:52	JHERNAN	--	--	N/A
Hexachlorobutadiene	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	00:52	JHERNAN	--	--	N/A
Isopropylbenzene	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	00:52	JHERNAN	--	--	N/A
m,p-Xylene	EPA 524.2	ND	mg/L	0.00100	10	10/06/2003	00:52	JHERNAN	--	--	N/A
Naphthalene	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	00:52	JHERNAN	--	--	N/A
n-Butylbenzene	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	00:52	JHERNAN	--	--	N/A

000528

To: ONDEO DE PUERTO RICO
P.O. BOX 5789
CAGUAS PR 00726

eqlab ENVIRONMENTAL QUAL LABORATORIES, INC

Attn: LCDO. JORGE FLECHAS
Source: POZO LOLA 1
Project Name: PRDOH
Facility: CAGUAS CENTRAL LABORATORY
Description: DRINKING WATER - Grab
Client Ref. #: 03M2679
PWSID: 3323

Laboratory Test Report

Sample Number:	446254	Collected Date & Time:	09/25/2003 10:10	Date of Report:	10/09/2003
Work Order:	1455-01-01	Received Date & Time:	09/29/2003 13:25	Collected By:	D.ROSSY
Delivery Slip:	2003-07734	Temperature at Arrival:	3 °C	Eqlab Rep.:	JFUENTES
Folder Number:	40327			Proposal Number:	3988 - 1

Remarks:

(28)

Parameter	Method	Results	Units	Limits LOD	Limits MCL	Analysis Date	Analysis Time	Analysis By	Prep Method Date	Prep Method By	Method
n-Propylbenzene	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	00:52	JHERNAN	--	--	N/A
o-Xylene	EPA 524.2	ND	mg/L	0.000500	10	10/06/2003	00:52	JHERNAN	--	--	N/A
sec-Butylbenzene	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	00:52	JHERNAN	--	--	N/A
Styrene	EPA 524.2	ND	mg/L	0.000500	0.100	10/06/2003	00:52	JHERNAN	--	--	N/A
tert-Butylbenzene	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	00:52	JHERNAN	--	--	N/A
Tetrachloroethene	EPA 524.2	0.0034	mg/L	0.000500	0.005	10/06/2003	00:52	JHERNAN	--	--	N/A
Toluene	EPA 524.2	ND	mg/L	0.000500	1	10/06/2003	00:52	JHERNAN	--	--	N/A
trans-1,2-Dichloroethene	EPA 524.2	ND	mg/L	0.000500	0.100	10/06/2003	00:52	JHERNAN	--	--	N/A
trans-1,3-Dichloropropene	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	00:52	JHERNAN	--	--	N/A
Trichloroethene	EPA 524.2	ND	mg/L	0.000500	0.005	10/06/2003	00:52	JHERNAN	--	--	N/A
Trichlorofluoromethane	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	00:52	JHERNAN	--	--	N/A
Vinyl chloride	EPA 524.2	ND	mg/L	0.000500	0.002	10/06/2003	00:52	JHERNAN	--	--	N/A

ISMAEL MARTINEZ JIMENEZ Químico Licenciado Estado Libre Asociado de Puerto Rico LICENCIA

000529

ND = Not Detected MCL = Maximum Contaminant Level BDL = Below Detection Limit DNI = D... LOD = Limit of Detection N/A = Not Applicable
MO = Monitoring Only. All results are calculated on a wet weight ... otherwise stated.

To: ONDEO DE PUERTO RICO
P.O. BOX 5789
CAGUAS PR 00726

eqlab ENVIRONMENTAL QUALITY LABORATORIES, INC.

Attn: LCDO. JORGE FLECHAS
Source: POZO RETIRO
Project Name: PRDOH
Facility: CAGUAS CENTRAL LABORATORY
Description: DRINKING WATER - Grab
Client Ref. #: 03M2677
PWSID: 3323

Laboratory Test Report

Sample Number:	446252	Collected Date & Time:	09/25/2003 10:40	Date of Report:	10/09/2003
Work Order:	1455-01-01	Received Date & Time:	09/29/2003 13:25	Collected By:	D.ROSSY
Delivery Slip:	2003-07734	Temperature at Arrival:	3 °C	Eqlab Rep.:	JFUENTES
Folder Number:	40327			Proposal Number:	3988 - 1

Remarks:

(82)

Parameter	Method	Results	Units	Limits LOD	Limits MCL	Analysis Date	Analysis Time	Analysis By	Prep Method Date	Prep Method By	Prep Method Method
n-Propylbenzene	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	04:48	JHERNAN	–	–	N/A
o-Xylene	EPA 524.2	ND	mg/L	0.000500	10	10/06/2003	04:48	JHERNAN	–	–	N/A
sec-Butylbenzene	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	04:48	JHERNAN	–	–	N/A
Styrene	EPA 524.2	ND	mg/L	0.000500	0.100	10/06/2003	04:48	JHERNAN	–	–	N/A
tert-Butylbenzene	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	04:48	JHERNAN	–	–	N/A
Tetrachloroethene	EPA 524.2	0.0009	mg/L	0.000500	0.005	10/06/2003	04:48	JHERNAN	–	–	N/A
Toluene	EPA 524.2	ND	mg/L	0.000500	1	10/06/2003	04:48	JHERNAN	–	–	N/A
trans-1,2-Dichloroethene	EPA 524.2	ND	mg/L	0.000500	0.100	10/06/2003	04:48	JHERNAN	–	–	N/A
trans-1,3-Dichloropropene	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	04:48	JHERNAN	–	–	N/A
Trichloroethene	EPA 524.2	ND	mg/L	0.000500	0.005	10/06/2003	04:48	JHERNAN	–	–	N/A
Trichlorofluoromethane	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	04:48	JHERNAN	–	–	N/A
Vinyl chloride	EPA 524.2	ND	mg/L	0.000500	0.002	10/06/2003	04:48	JHERNAN	–	–	N/A

ISMAEL MARTINEZ JIMENEZ Químico Licenciado Estado Libre Asociado de Puerto Rico LICENCIA NUM

Certified by

ND = Not Detected MCL = Maximum Contaminant Level BDL = Below Detection Limit DNI = Does Not Ignite LOD = Limit of Detection N/A = Not Applicable
MO = Monitoring Only. All results are calculated on a wet weight basis unless otherwise stated.

~~0005530~~

To: ONDEO DE PUERTO RICO
P.O. BOX 5789
CAGUAS PR 00726

Attn: LCDO. JORGE FLECHAS
Source: POZO LOLA 2
Project Name: PRDOH
Facility: CAGUAS CENTRAL LABORATORY
Description: DRINKING WATER - Grab
Client Ref. #: 03M2680
PWSID: 3323

Laboratory Test Report

Sample Number:	446255	Collected Date & Time:	09/25/2003 11:05	Date of Report:	10/09/2003
Work Order:	1455-01-01	Received Date & Time:	09/29/2003 13:25	Collected By:	D.ROSSY
Delivery Slip:	2003-07734	Temperature at Arrival:	3 °C	Eqlab Rep.:	JFUENTES
Folder Number:	40327			Proposal Number:	3988 - 1

Remarks:

30

Parameter	Method	Results	Units	Limits LOD	Limits MCL	Analysis Date	Analysis Time	Analysis By	Prep Method Date	Prep Method By	Prep Method Method
Chloroethane	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	02:12	JHERNAN	--	--	N/A
Chloroform	EPA 524.2	0.0021	mg/L	0.000500	--	10/06/2003	02:12	JHERNAN	--	--	N/A
Chloromethane	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	02:12	JHERNAN	--	--	N/A
cis-1,2-Dichloroethene	EPA 524.2	ND	mg/L	0.000500	0.070	10/06/2003	02:12	JHERNAN	--	--	N/A
cis-1,3-Dichloropropene	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	02:12	JHERNAN	--	--	N/A
Dibromochloromethane	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	02:12	JHERNAN	--	--	N/A
Dibromomethane	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	02:12	JHERNAN	--	--	N/A
Dichlorodifluoromethane	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	02:12	JHERNAN	--	--	N/A
Dichloromethane	EPA 524.2	ND	mg/L	0.000500	0.005	10/06/2003	02:12	JHERNAN	--	--	N/A
Epichlorohydrin	EPA 524.2	ND	mg/L	0.0500	--	10/06/2003	02:12	JHERNAN	--	--	N/A
Ethylbenzene	EPA 524.2	ND	mg/L	0.000500	0.700	10/06/2003	02:12	JHERNAN	--	--	N/A
Hexachlorobutadiene	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	02:12	JHERNAN	--	--	N/A
Isopropylbenzene	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	02:12	JHERNAN	--	--	N/A
m,p-Xylene	EPA 524.2	ND	mg/L	0.00100	10	10/06/2003	02:12	JHERNAN	--	--	N/A
Naphthalene	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	02:12	JHERNAN	--	--	N/A
n-Butylbenzene	EPA 524.2	ND	mg/L	0.000500	--	10/06/2003	02:12	JHERNAN	--	--	N/A

~~000531~~

T ONDEO DE PUERTO RICO
P.O. BOX 5789
CAGUAS PR 00726

eqlab ENVIRONMENTAL QUALITY LABORATORIES, INC.

Attn: LCDO. JORGE FLECHAS
Source: POZO LOLA 1 SAN GERMAN
Project Name: PRDOH
Facility: CAGUAS CENTRAL LABORATORY
Description: DRINKING WATER - Grab
Client Ref. #: 03M2880
PWSID: 3323

Laboratory Test Report

Sample Number:	458969	Collected Date & Time:	10/23/2003 11:20	Date of Report:	11/05/2003
Work Order:	1455-01-01	Received Date & Time:	10/27/2003 11:00	Collected By:	DROSSY
Delivery Slip:	2003-08651	Temperature at Arrival:	3 °C	Eqlab Rep.:	JFUENTES
Folder Number:	41316			Proposal Number:	3988 - 1

Remarks:

31

Parameter	Method	Results	Units	Limits		Analysis			Prep Method		
				LOD	MCL	Date	Time	By	Date	By	Method
Chloroethane	EPA 524.2	ND	mg/L	0.000500	--	10/31/2003	19:41	JHERNAN	--	--	N/A
Chloroform	EPA 524.2	ND	mg/L	0.000500	--	10/31/2003	19:41	JHERNAN	--	--	N/A
Chloromethane	EPA 524.2	ND	mg/L	0.000500	--	10/31/2003	19:41	JHERNAN	--	--	N/A
cis-1,2-Dichloroethene	EPA 524.2	0.0006	mg/L	0.000500	0.070	10/31/2003	19:41	JHERNAN	--	--	N/A
cis-1,3-Dichloropropene	EPA 524.2	ND	mg/L	0.000500	--	10/31/2003	19:41	JHERNAN	--	--	N/A
Dibromochloromethane	EPA 524.2	ND	mg/L	0.000500	--	10/31/2003	19:41	JHERNAN	--	--	N/A
Dibromomethane	EPA 524.2	ND	mg/L	0.000500	--	10/31/2003	19:41	JHERNAN	--	--	N/A
Dichlorodifluoromethane	EPA 524.2	ND	mg/L	0.000500	--	10/31/2003	19:41	JHERNAN	--	--	N/A
Dichloromethane	EPA 524.2	ND	mg/L	0.000500	0.005	10/31/2003	19:41	JHERNAN	--	--	N/A
Epichlorohydrin	EPA 524.2	ND	mg/L	0.0500	--	10/31/2003	19:41	JHERNAN	--	--	N/A
Ethylbenzene	EPA 524.2	ND	mg/L	0.000500	0.700	10/31/2003	19:41	JHERNAN	--	--	N/A
Hexachlorobutadiene	EPA 524.2	ND	mg/L	0.000500	--	10/31/2003	19:41	JHERNAN	--	--	N/A
Isopropylbenzene	EPA 524.2	ND	mg/L	0.000500	--	10/31/2003	19:41	JHERNAN	--	--	N/A
m,p-Xylene	EPA 524.2	ND	mg/L	0.00100	10	10/31/2003	19:41	JHERNAN	--	--	N/A
Naphthalene	EPA 524.2	ND	mg/L	0.000500	--	10/31/2003	19:41	JHERNAN	--	--	N/A
n-Butylbenzene	EPA 524.2	ND	mg/L	0.000500	--	10/31/2003	19:41	JHERNAN	--	--	N/A

~~000559~~

To: ONDEO DE PUERTO RICO
P.O. BOX 5789
CAGUAS PR 00726

Attn: LCDO. JORGE FLECHAS
Source: POZO LOLA 1 SAN GERMAN
Project Name: PRDOH
Facility: CAGUAS CENTRAL LABORATORY
Description: DRINKING WATER - Grab
Client Ref. #: 03M2880
PWSID: 3323

eqlab ENVIRONMENTAL QUALITY LABORATORIES, INC.

Laboratory Test Report

Sample Number:	458969	Collected Date & Time:	10/23/2003	11:20		Date of Report:	11/05/2003
Work Order:	1455-01-01	Received Date & Time:	10/27/2003	11:00		Collected By:	DROSSY
Delivery Slip:	2003-08651	Temperature at Arrival:	3 °C			Eqlab Rep.:	JFUENTES
Folder Number:	41316					Proposal Number:	3988 - 1

Remarks:

32

Parameter	Method	Results	Units	Limits		Analysis			Prep Method		
				LOD	MCL	Date	Time	By	Date	By	Method
n-Propylbenzene	EPA 524.2	ND	mg/L	0.000500	--	10/31/2003	19:41	JHERNAN	--	--	N/A
o-Xylene	EPA 524.2	ND	mg/L	0.000500	10	10/31/2003	19:41	JHERNAN	--	--	N/A
sec-Butylbenzene	EPA 524.2	ND	mg/L	0.000500	--	10/31/2003	19:41	JHERNAN	--	--	N/A
Styrene	EPA 524.2	ND	mg/L	0.000500	0.100	10/31/2003	19:41	JHERNAN	--	--	N/A
tert-Butylbenzene	EPA 524.2	ND	mg/L	0.000500	--	10/31/2003	19:41	JHERNAN	--	--	N/A
• Tetrachloroethene	EPA 524.2	0.0057	mg/L	0.000500	0.005	10/31/2003	19:41	JHERNAN	--	--	N/A
Toluene	EPA 524.2	ND	mg/L	0.000500	1	10/31/2003	19:41	JHERNAN	--	--	N/A
trans-1,2-Dichloroethene	EPA 524.2	ND	mg/L	0.000500	0.100	10/31/2003	19:41	JHERNAN	--	--	N/A
trans-1,3-Dichloropropene	EPA 524.2	ND	mg/L	0.000500	--	10/31/2003	19:41	JHERNAN	--	--	N/A
Trichloroethene	EPA 524.2	ND	mg/L	0.000500	0.005	10/31/2003	19:41	JHERNAN	--	--	N/A
Trichlorofluoromethane	EPA 524.2	ND	mg/L	0.000500	--	10/31/2003	19:41	JHERNAN	--	--	N/A
Vinyl chloride	EPA 524.2	ND	mg/L	0.000500	0.002	10/31/2003	19:41	JHERNAN	--	--	N/A

ISMAEL MARTINEZ JIMENEZ
Químico Licenciado
Estado Libre Asociado de Puerto Rico
LICENCIA NUM. 86

ND = Not Detected MCL = Maximum Contaminant Level BDL = Below Detection Limit DNI = Does Not Ignite LOD = Limit of Detection N/A = Not Applicable
MO = Monitoring Only. All results are calculated on a wet weight basis unless otherwise stated.

To:	ONDEO DE PUERTO RICO P.O. BOX 5789 CAGUAS PR 00726

Attn:	LCDO. JORGE FLECHAS
Source:	POZO RETIRO SAN GERMAN
Project Name:	PRDOH
Facility:	CAGUAS CENTRAL LABORATORY
Description:	DRINKING WATER - Grab
Client Ref. #:	03M2881
PWSID:	3323

eqlab ENVIRONMENTAL QUALITY LABORATORIES, INC.

Laboratory Test Report

Sample Number:	458970	Collected Date & Time:	10/23/2003 11:45	Date of Report:	11/05/2003
Work Order:	1455-01-01	Received Date & Time:	10/27/2003 11:00	Collected By:	DROSSY
Delivery Slip:	2003-08651	Temperature at Arrival:	3 °C	Eqlab Rep.:	JFUENTES
Folder Number:	41316			Proposal Number:	3988 - 1

Remarks:

33

Parameter	Method	Results	Units	Limits		Analysis			Prep Method		
				LOD	MCL	Date	Time	By	Date	By	Method
n-Propylbenzene	EPA 524.2	ND	mg/L	0.000500	--	10/31/2003	20:36	JHERNAN	--	--	N/A
o-Xylene	EPA 524.2	ND	mg/L	0.000500	10	10/31/2003	20:36	JHERNAN	--	--	N/A
sec-Butylbenzene	EPA 524.2	ND	mg/L	0.000500	--	10/31/2003	20:36	JHERNAN	--	--	N/A
Styrene	EPA 524.2	ND	mg/L	0.000500	0.100	10/31/2003	20:36	JHERNAN	--	--	N/A
tert-Butylbenzene	EPA 524.2	ND	mg/L	0.000500	--	10/31/2003	20:36	JHERNAN	--	--	N/A
Tetrachloroethene	EPA 524.2	0.0014	mg/L	0.000500	0.005	10/31/2003	20:36	JHERNAN	--	--	N/A
Toluene	EPA 524.2	ND	mg/L	0.000500	1	10/31/2003	20:36	JHERNAN	--	--	N/A
trans-1,2-Dichloroethene	EPA 524.2	ND	mg/L	0.000500	0.100	10/31/2003	20:36	JHERNAN	--	--	N/A
trans-1,3-Dichloropropene	EPA 524.2	ND	mg/L	0.000500	--	10/31/2003	20:36	JHERNAN	--	--	N/A
Trichloroethene	EPA 524.2	ND	mg/L	0.000500	0.005	10/31/2003	20:36	JHERNAN	--	--	N/A
Trichlorofluoromethane	EPA 524.2	ND	mg/L	0.000500	--	10/31/2003	20:36	JHERNAN	--	--	N/A
Vinyl chloride	EPA 524.2	ND	mg/L	0.000500	0.002	10/31/2003	20:36	JHERNAN	--	--	N/A

ISMAEL MARTINEZ JIMENEZ Químico Licenciado Estado Libre Asociado de Puerto Rico LICENCIA NUM. 1486

Certified by

ND = Not Detected MCL = Maximum Contaminant Level BDL = Below Detection Limit DNI = Does Not Ignite LOD = Limit of Detection N/A = Not Applicable
MO = Monitoring Only. All results are calculated on a wet weight basis unless otherwise stated.

Autoridad Acueductos Alcantarillados - Ondeo de P.R.
Laboratorio Central Caguas
P.O. Box 5789, Caguas, P.R. 00726
Tel. 787-746-1925 Fax 787-745-4707

RE-GE012-04/1

INFORME DE ANALISIS DE AGUA POTABLE

Análisis: VOC's Regulados

No.Muestra: 03-M-2926
Fecha Muestra: 11/6/03
Hora Muestra: 4:53 PM
Fecha Analisis: 11/16/03
Analista: EMS
Fecha Informe: 12/1/03

PWSID: 3323
Region: MAYAGUEZ
Sistema: SAN GERMAN URB
Municipio: SAN GERMAN
Requerida por: Depto. de Salud
Dirección: San Juan PR

I.D. Punto: *POZO LOLA RODRIGUEZ DE TIO I*
Direccion: *AVE. CASTRO PEREZ*
CENTRO GUBERNAMENTAL

Método EPA	Parámetro	Resultado	Unidades	MDL	MCL
502.2	Benceno	<0.0005	mg/L	0.0005	0.005
502.2	Tetracloruro de Carbono	<0.0005	mg/L	0.0005	0.005
502.2	Clorobenceno	<0.0005	mg/L	0.0005	0.1
502.2	Tetracloroeteno	0.0032	mg/L	0.0005	0.005
502.2	Tolueno	<0.0005	mg/L	0.0005	1
502.2	1,2,4 - Triclorobenceno	<0.0005	mg/L	0.0005	0.07
502.2	1,1,1 - Tricloroetano	<0.0005	mg/L	0.0005	0.2
502.2	1,1,2 - Tricloroetano	<0.0005	mg/L	0.0005	0.005
502.2	Tricloroeteno	<0.0005	mg/L	0.0005	0.005
502.2	Clororuro de Vinilo	<0.0005	mg/L	0.0005	0.002
502.2	Xileno Total	<0.0005	mg/L	0.0005	10
502.2	1,2 - Diclorobenceno	<0.0005	mg/L	0.0005	0.6
502.2	1,4 - Diclorobenceno	<0.0005	mg/L	0.0005	0.075
502.2	1,2 - Dicloroetano	<0.0005	mg/L	0.0005	0.005
502.2	1,1 - Dicloroeteno	<0.0005	mg/L	0.0005	0.007
502.2	Cis - 1,2 - Dicloroeteno	0.0005	mg/L	0.0005	0.07
502.2	Trans - 1,2 - Dicloroeteno	<0.0005	mg/L	0.0005	0.1
502.2	1,2 - Dicloropropano	<0.0005	mg/L	0.0005	0.005
502.2	Etilbenceno	<0.0005	mg/L	0.0005	0.7
502.2	Estireno	<0.0005	mg/L	0.0005	0.1
502.2	Diclorometano	<0.0005	mg/L	0.0005	0.005

Comentarios:

Quimico II
Nombre / Titulo

Firma

ESTADO LIBRE ASOCIADO DE PUERTO RICO
QUIMICO LICENCIADO

Nombre / Titulo

Firma

34

Nota: El resultado de este análisis se refiere exclusivamante a la muestra analizada

To: AUTORIDAD DE ACUEDUCTOS Y ALCANTARILLADOS
P.O. BOX 5789
CAGUAS PR 00726

Attn: LCDO. JORGE FLECHAS
Source: **POZO RETIRO**
Project Name: PRDOH
Facility: CAGUAS CENTRAL LAB.
Description: DRINKING WATER - Grab
Client Ref. #: 04M0834
PWSID: 3323

eqlab ENVIRONMENTAL QUALITY LABORATORIES, INC.

Laboratory Test Report

Sample Number:	533211	Collected Date & Time:	05/12/2004 10:20	Date of Report:	05/20/2004
Work Order:	1502-01-01	Received Date & Time:	05/13/2004 12:00	Collected By:	HRODRIGUEZ
Delivery Slip:	2004-03885	Temperature at Arrival:	3 °C	Eqlab Rep.:	YRIOS
Folder Number:	47517			Proposal Number:	5411 - 1

Remarks:

Parameter	Method	Results	Units	Limits LOD	Limits MCL	Analysis Date	Analysis Time	Analysis By	Prep Method Date	Prep Method By	Prep Method Method
n-Propylbenzene	EPA 524.2	ND	mg/L	0.0005	--	05/16/2004	20:18	JCATONI	--	--	N/A
o-Dichlorobenzene	EPA 524.2	ND	mg/L	0.0005	0.600	05/16/2004	20:18	JCATONI	--	--	N/A
o-Xylene	EPA 524.2	ND	mg/L	0.0005	10.00	05/16/2004	20:18	JCATONI	--	--	N/A
sec-Butylbenzene	EPA 524.2	ND	mg/L	0.0005	--	05/16/2004	20:18	JCATONI	--	--	N/A
Styrene	EPA 524.2	ND	mg/L	0.0005	0.100	05/16/2004	20:18	JCATONI	--	--	N/A
tert-Butylbenzene	EPA 524.2	ND	mg/L	0.0005	--	05/16/2004	20:18	JCATONI	--	--	N/A
Tetrachloroethene	EPA 524.2	0.0017	mg/L	0.0005	0.005	05/16/2004	20:18	JCATONI	--	--	N/A
Toluene	EPA 524.2	ND	mg/L	0.0005	1.000	05/16/2004	20:18	JCATONI	--	--	N/A
trans-1,2-Dichloroethene	EPA 524.2	ND	mg/L	0.0005	0.100	05/16/2004	20:18	JCATONI	--	--	N/A
trans-1,3-Dichloropropene	EPA 524.2	ND	mg/L	0.0005	--	05/16/2004	20:18	JCATONI	--	--	N/A
Trichloroethene	EPA 524.2	ND	mg/L	0.0005	0.005	05/16/2004	20:18	JCATONI	--	--	N/A
Trichlorofluoromethane	EPA 524.2	ND	mg/L	0.0005	--	05/16/2004	20:18	JCATONI	--	--	N/A
Vinyl chloride	EPA 524.2	ND	mg/L	0.0005	0.002	05/16/2004	20:18	JCATONI	--	--	N/A

CARLOS GALINDO VELAZQUEZ
Químico Licenciado
Estado Libre Asociado de Puerto Rico
LICENCIA NUM. 3491

Certified by:

ACCREDITED IN ACCORDANCE WITH nelac

The results presented herein meet all NELAC requirements

ND = Not Detected MCL = Maximum Contaminant Level BDL = Below Detection Limit DNI = Does Not Ignite LOD = Limit of Detection N/A = Not Applicable
MO = Monitoring Only. All results are calculated on a wet weight basis unless otherwise stated.

To: AUTORIDAD DE ACUEDUCTOS Y ALCANTARILLADOS
P.O. BOX 5789
CAGUAS PR 00726

Attn: LCDO. JORGE FLECHAS
Source: POZO LOLA 2
Project Name: PRDOH
Facility: CAGUAS CENTRAL LAB.
Description: DRINKING WATER - Grab
Client Ref. #: 04M0832
PWSID: 3323

eqlab ENVIRONMENTAL QUALITY LABORATORIES, INC.

Laboratory Test Report

Sample Number: 533209	Collected Date & Time:	05/12/2004	10:45	Date of Report:	05/20/2004
Work Order: 1502-01-01	Received Date & Time:	05/13/2004	12:00	Collected By:	HRODRIGUEZ
Delivery Slip: 2004-03885	Temperature at Arrival:	3 °C		Eqlab Rep.:	YRIOS
Folder Number: 47517				Proposal Number:	5411 - 1

Remarks:

(34)

Parameter	Method	Results	Units	Limits LOD	Limits MCL	Analysis Date	Analysis Time	Analysis By	Prep Method Date	Prep Method By	Prep Method Method
Chloroethane	EPA 524.2	ND	mg/L	0.0005	--	05/16/2004	21:31	JCATONI	--	--	N/A
Chloroform	EPA 524.2	0.0010	mg/L	0.0005	0.080	05/16/2004	21:31	JCATONI	--	--	N/A
Chloromethane	EPA 524.2	ND	mg/L	0.0005	--	05/16/2004	21:31	JCATONI	--	--	N/A
cis-1,2-Dichloroethene	EPA 524.2	ND	mg/L	0.0005	0.070	05/16/2004	21:31	JCATONI	--	--	N/A
cis-1,3-Dichloropropene	EPA 524.2	ND	mg/L	0.0005	--	05/16/2004	21:31	JCATONI	--	--	N/A
Dibromochloromethane	EPA 524.2	ND	mg/L	0.0005	0.080	05/16/2004	21:31	JCATONI	--	--	N/A
Dibromomethane	EPA 524.2	ND	mg/L	0.0005	--	05/16/2004	21:31	JCATONI	--	--	N/A
Dichlorodifluoromethane	EPA 524.2	ND	mg/L	0.0005	--	05/16/2004	21:31	JCATONI	--	--	N/A
Dichloromethane	EPA 524.2	ND	mg/L	0.0005	0.005	05/16/2004	21:31	JCATONI	--	--	N/A
Epichlorohydrin	EPA 524.2	ND	mg/L	0.0075	--	05/16/2004	21:31	JCATONI	--	--	N/A
Ethylbenzene	EPA 524.2	ND	mg/L	0.0005	0.700	05/16/2004	21:31	JCATONI	--	--	N/A
Hexachlorobutadiene	EPA 524.2	ND	mg/L	0.0005	--	05/16/2004	21:31	JCATONI	--	--	N/A
Isopropylbenzene	EPA 524.2	ND	mg/L	0.0005	--	05/16/2004	21:31	JCATONI	--	--	N/A
m,p-Xylene	EPA 524.2	ND	mg/L	0.0010	10.00	05/16/2004	21:31	JCATONI	--	--	N/A
Naphthalene	EPA 524.2	ND	mg/L	0.0005	--	05/16/2004	21:31	JCATONI	--	--	N/A
n-Butylbenzene	EPA 524.2	ND	mg/L	0.0005	--	05/16/2004	21:31	JCATONI	--	--	N/A

000220

IN ACCORDANCE WITH NELAC

ND = Not Detected MCL = Maximum Contaminant Level BDL = Below Detection [illegible] DNI = Does Not Ignite LOD = Limit of Detection N/A = Not Applicable
MO = Monitoring Only. All results are calcul[illegible] wet weight basis unless otherwise stated.

To: ORIDAD DE ACUEDUCTOS Y ALCANTARILLADOS
BOX 5789
CAGUAS PR 00726

ENVIRONMENTAL QUALITY LABORATORIES, INC.

Attn: LCDO. JORGE FLECHAS
Source: **POZO LOLA 1**
Project Name: PRDOH
Facility: CAGUAS CENTRAL LAB.
Description: DRINKING WATER - Grab
Client Ref. #: 04M0831
PWSID: 3323

Laboratory Test Report

Sample Number:	533208	Collected Date & Time:	05/12/2004 11:05	Date of Report:	05/20/2004
Work Order:	1502-01-01	Received Date & Time:	05/13/2004 12:00	Collected By:	HRODRIGUEZ
Delivery Slip:	2004-03885	Temperature at Arrival:	3 °C	Eqlab Rep.:	YRIOS
Folder Number:	47517			Proposal Number:	5411 - 1

Remarks:

Parameter	Method	Results	Units	Limits LOD	Limits MCL	Analysis Date	Analysis Time	Analysis By	Prep Method Date	Prep Method By	Prep Method Method
oroethane	EPA 524.2	ND	mg/L	0.0005	--	05/16/2004	22:07	JCATONI	--	--	N/A
oroform	EPA 524.2	0.0009	mg/L	0.0005	0.080	05/16/2004	22:07	JCATONI	--	--	N/A
oromethane	EPA 524.2	ND	mg/L	0.0005	--	05/16/2004	22:07	JCATONI	--	--	N/A
1,2-Dichloroethene	EPA 524.2	ND	mg/L	0.0005	0.070	05/16/2004	22:07	JCATONI	--	--	N/A
1,3-Dichloropropene	EPA 524.2	ND	mg/L	0.0005	--	05/16/2004	22:07	JCATONI	--	--	N/A
romochloromethane	EPA 524.2	ND	mg/L	0.0005	0.080	05/16/2004	22:07	JCATONI	--	--	N/A
romomethane	EPA 524.2	ND	mg/L	0.0005	--	05/16/2004	22:07	JCATONI	--	--	N/A
ılorodifluoromethane	EPA 524.2	ND	mg/L	0.0005	--	05/16/2004	22:07	JCATONI	--	--	N/A
ıloromethane	EPA 524.2	ND	mg/L	0.0005	0.005	05/16/2004	22:07	JCATONI	--	--	N/A
chlorohydrin	EPA 524.2	ND	mg/L	0.0075	--	05/16/2004	22:07	JCATONI	--	--	N/A
lbenzene	EPA 524.2	ND	mg/L	0.0005	0.700	05/16/2004	22:07	JCATONI	--	--	N/A
achlorobutadiene	EPA 524.2	ND	mg/L	0.0005	--	05/16/2004	22:07	JCATONI	--	--	N/A
ropylbenzene	EPA 524.2	ND	mg/L	0.0005	--	05/16/2004	22:07	JCATONI	--	--	N/A
Xylene	EPA 524.2	ND	mg/L	0.0010	10.00	05/16/2004	22:07	JCATONI	--	--	N/A
ıthalene	EPA 524.2	ND	mg/L	0.0005	--	05/16/2004	22:07	JCATONI	--	--	N/A
tylbenzene	EPA 524.2	ND	mg/L	0.0005	--	05/16/2004	22:07	JCATONI	--	--	N/A

ACCREDITED IN ACCORDANCE WITH nelac

ND = Not Detected MCL = Maximum Contaminant Level BDL = Below Detection Limit DNI = Does Not Ignite LOD = Limit of Detection N/A = Not Applicable
MO = Monitoring Only. All results are calculated on a wet weight basis unless otherwise stated.

): AUTORIDAD DE ACUEDUCTOS Y ALCANTARILLADOS
P.O. BOX 5789
CAGUAS PR 00726

ENVIRONMENTAL QUALITY LABORATORIES, INC.

tn:	LCDO. JORGE FLECHAS
urce:	**POZO LOLA 1**
oject Name:	PRDOH
cility:	CAGUAS CENTRAL LAB.
scription:	DRINKING WATER - Grab
ient Ref. #:	04M0831
VSID:	3323

Laboratory Test Report

mple Number:	533208	Collected Date & Time:	05/12/2004	11:05	Date of Report:	05/20/2004
ork Order:	1502-01-01	Received Date & Time:	05/13/2004	12:00	Collected By:	HRODRIGUEZ
livery Slip:	2004-03885	Temperature at Arrival:	3 °C		Eqlab Rep.:	YRIOS
lder Number:	47517				Proposal Number:	5411 - 1

marks:

Parameter	Method	Results	Units	Limits LOD	Limits MCL	Analysis Date	Analysis Time	Analysis By	Prep Method Date	Prep Method By	Prep Method Method
opylbenzene	EPA 524.2	ND	mg/L	0.0005	--	05/16/2004	22:07	JCATONI	--	--	N/A
chlorobenzene	EPA 524.2	ND	mg/L	0.0005	0.600	05/16/2004	22:07	JCATONI	--	--	N/A
lene	EPA 524.2	ND	mg/L	0.0005	10.00	05/16/2004	22:07	JCATONI	--	--	N/A
Butylbenzene	EPA 524.2	ND	mg/L	0.0005	--	05/16/2004	22:07	JCATONI	--	--	N/A
ne	EPA 524.2	ND	mg/L	0.0005	0.100	05/16/2004	22:07	JCATONI	--	--	N/A
Butylbenzene	EPA 524.2	ND	mg/L	0.0005	--	05/16/2004	22:07	JCATONI	--	--	N/A
ichloroethene	EPA 524.2	0.0014	mg/L	0.0005	0.005	05/16/2004	22:07	JCATONI	--	--	N/A
ene	EPA 524.2	ND	mg/L	0.0005	1.000	05/16/2004	22:07	JCATONI	--	--	N/A
-1,2-Dichloroethene	EPA 524.2	ND	mg/L	0.0005	0.100	05/16/2004	22:07	JCATONI	--	--	N/A
-1,3-Dichloropropene	EPA 524.2	ND	mg/L	0.0005	--	05/16/2004	22:07	JCATONI	--	--	N/A
iloroethene	EPA 524.2	ND	mg/L	0.0005	0.005	05/16/2004	22:07	JCATONI	--		N/A
ilorofluoromethane	EPA 524.2	ND	mg/L	0.0005	--	05/16/2004	22:07	JCATONI			N/A
l chloride	EPA 524.2	ND	mg/L	0.0005	0.002	05/16/2004	22:07	JCATONI			N/A

CARLOS GALINDO VELAZQUEZ
Químico Licenciado
Estado Libre Asociado de Puerto Rico
Certified By

000788

ACCREDITED IN ACCORDANCE WITH NELAC

sults presented herein i NELAC requirements

ND = Not Detected MCL = Maximum Contaminant Level BDL = Below Detection Limit DNI Ignite LOD = Limit of Detection N/A = Not Applicable
MO = Monitoring Only. All results are calculated on a wet unless otherwise stated.

To: AUTORIDAD DE ACUEDUCTOS Y ALCANTARILLADOS
P.O. BOX 5789
CAGUAS PR 00726

eqlab ENVIRONMENTAL QUALITY LABORATORIES, INC.

Attn:	LCDO. JORGE FLECHAS
Source:	**POZO RETIRO**
Project Name:	PRDOH
Facility:	CAGUAS CENTRAL LAB.
Description:	DRINKING WATER - Grab
Client Ref. #:	04M1562
PWSID:	3323

Laboratory Test Report

Sample Number:	580760	Collected Date & Time:	08/19/2004	16:15	Date of Report:	08/31/2004
Work Order:	1502-01-01	Received Date & Time:	08/23/2004	11:00	Collected By:	DROSSY
Delivery Slip:	2004-07376	Temperature at Arrival:	3 °C		Eqlab Rep.:	YRIOS
Folder Number:	51294				Proposal Number:	5411 - 1

Remarks:

32

Parameter	Method	Results	Units	Limits		Analysis			Prep Method		
				LOD	MCL	Date	Time	By	Date	By	Method
o-Dichlorobenzene	EPA 524.2	ND	mg/L	0.0005	--	08/27/2004	09:19	JCATONI	--	--	N/A
o-Xylene	EPA 524.2	ND	mg/L	0.0005	--	08/27/2004	09:19	JCATONI	--	--	N/A
sec-Butylbenzene	EPA 524.2	ND	mg/L	0.0005	--	08/27/2004	09:19	JCATONI	--	--	N/A
Styrene	EPA 524.2	ND	mg/L	0.0005	--	08/27/2004	09:19	JCATONI	--	--	N/A
tert-Butylbenzene	EPA 524.2	ND	mg/L	0.0005	--	08/27/2004	09:19	JCATONI	--	--	N/A
Tetrachloroethene	EPA 524.2	0.0031	mg/L	0.0005	--	08/27/2004	09:19	JCATONI	--	--	N/A
Toluene	EPA 524.2	ND	mg/L	0.0005	--	08/27/2004	09:19	JCATONI	--	--	N/A
trans-1,2-Dichloroethene	EPA 524.2	ND	mg/L	0.0005	--	08/27/2004	09:19	JCATONI	--	--	N/A
trans-1,3-Dichloropropene	EPA 524.2	ND	mg/L	0.0005	--	08/27/2004	09:19	JCATONI	--	--	N/A
Trichloroethene	EPA 524.2	ND	mg/L	0.0005	--	08/27/2004	09:19	JCATONI	--	--	N/A
Trichlorofluoromethane	EPA 524.2	ND	mg/L	0.0005	--	08/27/2004	09:19	JCATONI	--	--	N/A
Vinyl chloride	EPA 524.2	ND	mg/L	0.0005	--	08/27/2004	09:19	JCATONI	--		N/A

CARLOS GALINDO VELAZQUEZ Químico Licenciado Estado Libre Asociado de Puerto Rico LICENCIA NUM

Certified by

000788

ACCREDITED IN ACCORDANCE WITH ela

The results presen... herein meet all NELAC requirements

ND = Not Detected MCL = Maximum Contaminant Level BDL = Below Detection Li... ...I = Does Not Ignite LOD = Limit of Detection N/A = Not Applicable
MO = Monitoring Only. All results are calculated ... ...ight basis unless otherwise stated.

To: AUTORIDAD DE ACUEDUCTOS Y ALCANTARILLADOS
P.O. BOX 5789
CAGUAS PR 00726

ENVIRONMENTAL QUALITY LABORATORIES, INC.

Attn:	LCDO. JORGE FLECHAS
Source:	**POZO LOLA 1**
Project Name:	PRDOH
Facility:	CAGUAS CENTRAL LAB.
Description:	DRINKING WATER - Grab
Client Ref. #:	04M1560
PWSID:	3323

Laboratory Test Report

Sample Number:	580758	Collected Date & Time:	08/19/2004 16:50	Date of Report:	08/31/2004
Work Order:	1502-01-01	Received Date & Time:	08/23/2004 11:00	Collected By:	DROSSY
Delivery Slip:	2004-07376	Temperature at Arrival:	3 °C	Eqlab Rep.:	YRIOS
Folder Number:	51294			Proposal Number:	5411 - 1

Remarks:

Parameter	Method	Results	Units	Limits		Analysis			Prep Method		
				LOD	MCL	Date	Time	By	Date	By	Method
o-Dichlorobenzene	EPA 524.2	ND	mg/L	0.0005	--	08/27/2004	20:50	JCATONI	--	--	N/A
o-Xylene	EPA 524.2	ND	mg/L	0.0005	--	08/27/2004	20:50	JCATONI	--	--	N/A
sec-Butylbenzene	EPA 524.2	ND	mg/L	0.0005	--	08/27/2004	20:50	JCATONI	--	--	N/A
Styrene	EPA 524.2	ND	mg/L	0.0005	--	08/27/2004	20:50	JCATONI	--	--	N/A
tert-Butylbenzene	EPA 524.2	ND	mg/L	0.0005	--	08/27/2004	20:50	JCATONI	--	--	N/A
Tetrachloroethene	EPA 524.2	0.0022	mg/L	0.0005	--	08/27/2004	20:50	JCATONI	--	--	N/A
Toluene	EPA 524.2	ND	mg/L	0.0005	--	08/27/2004	20:50	JCATONI	--	--	N/A
trans-1,2-Dichloroethene	EPA 524.2	ND	mg/L	0.0005	--	08/27/2004	20:50	JCATONI	--	--	N/A
trans-1,3-Dichloropropene	EPA 524.2	ND	mg/L	0.0005	--	08/27/2004	20:50	JCATONI	--	--	N/A
Trichloroethene	EPA 524.2	ND	mg/L	0.0005	--	08/27/2004	20:50	JCATONI	--		N/A
Trichlorofluoromethane	EPA 524.2	ND	mg/L	0.0005	--	08/27/2004	20:50	JCATONI	--		N/A
Vinyl chloride	EPA 524.2	ND	mg/L	0.0005	--	08/27/2004	20:50	JCATONI	--		N/A

CARLOS GALINDO VELAZQUEZ
Químico Licenciado
Estado Libre Asociado de Puerto Rico
LICENCIA NUM 491

Certified by

ACCREDITED IN ACCORDANCE WITH

The results presented herein meet all NELAC requirements

ND = Not Detected MCL = Maximum Contaminant Level BDL = Below Detection Limit ... Does Not Ignite LOD = Limit of Detection N/A = Not Applicable
MO = Monitoring Only. All results are calculated on a ... weight basis unless otherwise stated.

To: AUTORIDAD DE ACUEDUCTOS Y ALCANTARILLADOS
P.O. BOX 5789
CAGUAS PR 00726

eqlab ENVIRONMENTAL QUALITY LABORATORIES, INC.

Attn: LCDO. JORGE FLECHAS
Source: RETIRO
Project Name: PRDOH
Facility: ESTACION MAYAGUEZ
Description: DRINKING WATER - Grab
Client Ref. #: N/A
PWSID: 3323

Laboratory Test Report

Sample Number:	633156	Collected Date & Time:	12/04/2004 18:20	Date of Report:	12/14/2004
Work Order:	1502-01-27	Received Date & Time:	12/05/2004 16:00	Collected By:	WALVAREZ
Delivery Slip:	2004-12720	Temperature at Arrival:	3 °C	Eqlab Rep.:	YRIOS
Folder Number:	58034			Proposal Number:	5909 - 2

Remarks:

4

Parameter	Method	Results	Units	Limits LOD	Limits MCL	Analysis Date	Analysis Time	Analysis By	Prep Method Date	Prep Method By	Prep Method Method
o-Dichlorobenzene	EPA 524.2	ND	mg/L	0.0005	0.600	12/09/2004	06:29	JHERNANDEZ	--	--	N/A
o-Xylene	EPA 524.2	ND	mg/L	0.0005	10	12/09/2004	06:29	JHERNANDEZ	--	--	N/A
sec-Butylbenzene	EPA 524.2	ND	mg/L	0.0005	--	12/09/2004	06:29	JHERNANDEZ	--	--	N/A
Styrene	EPA 524.2	ND	mg/L	0.0005	0.100	12/09/2004	06:29	JHERNANDEZ	--	--	N/A
tert-Butylbenzene	EPA 524.2	ND	mg/L	0.0005	--	12/09/2004	06:29	JHERNANDEZ	--	--	N/A
Tetrachloroethene	EPA 524.2	0.0050	mg/L	0.0005	0.005	12/09/2004	06:29	JHERNANDEZ	--	--	N/A
Toluene	EPA 524.2	ND	mg/L	0.0005	1.0	12/09/2004	06:29	JHERNANDEZ	--	--	N/A
trans-1,2-Dichloroethene	EPA 524.2	ND	mg/L	0.0005	0.100	12/09/2004	06:29	JHERNANDEZ	--	--	N/A
trans-1,3-Dichloropropene	EPA 524.2	ND	mg/L	0.0005	--	12/09/2004	06:29	JHERNANDEZ	--		N/A
Trichloroethene	EPA 524.2	BDL	mg/L	0.0005	0.005	12/09/2004	06:29	JHERNANDEZ	--		N/A
Trichlorofluoromethane	EPA 524.2	ND	mg/L	0.0005	--	12/09/2004	06:29	JHERNANDEZ	--		N/A
Vinyl chloride	EPA 524.2	ND	mg/L	0.0005	0.002	12/09/2004	06:29	JHERNANDEZ	--		N/A

$1.00 $1.00

CARLOS G... VAZQUEZ
Estado Libre Asociado de Puerto Rico
LICENCIA NUM. 3401

Certified By

000864

ND = Not Detected MCL = Maximum Contaminant Level BDL = Below Detection Limit DNI = Does Not Ignite LOD = Limit of Detection N/A = Not Applicable
MO = Monitoring Only. All results are calculated on a wet weight basis unless otherwise stated.

Autoridad Acueductos Alcantarillados de P.R.
Laboratorio Central Caguas
P.O. Box 5789, Caguas, P.R. 00726
Tel. 787-746-1925 Fax 787-745-4707

INFORME DE ANALISIS DE AGUA POTABLE

Análisis: VOC's Regulados

No.Muestra: 05-M-0288
Fecha Muestra: 03-11-05
Hora Muestra: 11:11 AM
Fecha Analisis: 03-19-05
Analista: EMS
Fecha Informe: 04-20-05

I.D. Punto: *POZO RETIRO*
Direccion: *AVE. CASTO PEREZ*

PWSID: 3323
Region: MAYAGUEZ
Sistema: SAN GERMAN URB
Municipio: SAN GERMAN
Requerida por: Depto. de Salud
Dirección: San Juan PR

Método EPA	Parámetro	Resultado	Unidades	MDL	MCL
502.2	Benceno	<0.0005	mg/L	0.0005	0.005
502.2	Tetracloruro de Carbono	<0.0005	mg/L	0.0005	0.005
502.2	Clorobenceno	<0.0005	mg/L	0.0005	0.1
502.2	Tetracloroeteno	0.0041	mg/L	0.0005	0.005
502.2	Tolueno	<0.0005	mg/L	0.0005	1
502.2	1,2,4 - Triclorobenceno	<0.0005	mg/L	0.0005	0.07
502.2	1,1,1 - Tricloroetano	<0.0005	mg/L	0.0005	0.2
502.2	1,1,2 - Tricloroetano	<0.0005	mg/L	0.0005	0.005
502.2	Tricloroeteno	<0.0005	mg/L	0.0005	0.005
502.2	Clororuro de Vinilo	<0.0005	mg/L	0.0005	0.002
502.2	Xileno Total	<0.0005	mg/L	0.0005	10
502.2	1,2 - Diclorobenceno	<0.0005	mg/L	0.0005	0.6
502.2	1,4 - Diclorobenceno	<0.0005	mg/L	0.0005	0.075
502.2	1,2 - Dicloroetano	<0.0005	mg/L	0.0005	0.005
502.2	1,1 - Dicloroeteno	<0.0005	mg/L	0.0005	0.007
502.2	Cis - 1,2 - Dicloroeteno	<0.0005	mg/L	0.0005	0.07
502.2	Trans - 1,2 - Dicloroeteno	<0.0005	mg/L	0.0005	0.1
502.2	1,2 - Dicloropropano	<0.0005	mg/L	0.0005	0.005
502.2	Etilbenceno	<0.0005	mg/L	0.0005	0.7
502.2	Estireno	<0.0005	mg/L	0.0005	0.1
502.2	Diclorometano	<0.0005	mg/L	0.0005	0.005

Comentarios:

Químico II
Nombre / Titulo

Firma

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Luis E. Berrios Aguiló
Lic. 2402
QUIMICO LICENCIADO

Nombre / Titulo

Firma

42

Nota: El resultado de este análisis se refiere exclusivamente a la muestra analizada.

Autoridad Acueductos Alcantarillados de P.R.
Laboratorio Central Caguas
P.O. Box 5789, Caguas, P.R. 00726
Tel. 787-746-1925 Fax 787-746-4707

RE-GE012-04/1

INFORME DE ANALISIS DE AGUA POTABLE

Análisis: VOC's Regulados

No.Muestra: 05-M-0331
Fecha Muestra: 03-16-05
Hora Muestra: 10:00 AM
Fecha Analisis: 03-19-05
Analista: EMS
Fecha Informe: 04-20-05

PWSID: 3323
Region: MAYAGUEZ
Sistema: SAN GERMAN URB
Municipio: SAN GERMAN
Requerida por: Depto. de Salud
Dirección: San Juan PR

I.D. Punto: *POZO RETIRO*
Direccion: *AVE. CASTO PEREZ*

Método EPA	Parámetro	Resultado	Unidades	MDL	MCL
502.2	Benceno	<0.0005	mg/L	0.0005	0.005
502.2	Tetracloruro de Carbono	<0.0005	mg/L	0.0005	0.005
502.2	Clorobenceno	<0.0005	mg/L	0.0005	0.1
502.2	Tetracloroeteno	0.004	mg/L	0.0005	0.005
502.2	Tolueno	<0.0005	mg/L	0.0005	1
502.2	1,2,4 - Triclorobenceno	<0.0005	mg/L	0.0005	0.07
502.2	1,1,1 - Tricloroetano	<0.0005	mg/L	0.0005	0.2
502.2	1,1,2 - Tricloroetano	<0.0005	mg/L	0.0005	0.005
502.2	Tricloroeteno	<0.0005	mg/L	0.0005	0.005
502.2	Clororuro de Vinilo	<0.0005	mg/L	0.0005	0.002
502.2	Xileno Total	<0.0005	mg/L	0.0005	10
502.2	1,2 - Diclorobenceno	<0.0005	mg/L	0.0005	0.6
502.2	1,4 - Diclorobenceno	<0.0005	mg/L	0.0005	0.075
502.2	1,2 - Dicloroetano	<0.0005	mg/L	0.0005	0.005
502.2	1,1 - Dicloroeteno	<0.0005	mg/L	0.0005	0.007
502.2	Cis - 1,2 - Dicloroeteno	<0.0005	mg/L	0.0005	0.07
502.2	Trans - 1,2 - Dicloroeteno	<0.0005	mg/L	0.0005	0.1
502.2	1,2 - Dicloropropano	<0.0005	mg/L	0.0005	0.005
502.2	Etilbenceno	<0.0005	mg/L	0.0005	0.7
502.2	Estireno	<0.0005	mg/L	0.0005	0.1
502.2	Diclorometano	<0.0005	mg/L	0.0005	0.005

Comentarios:

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Luis E. Berrios Aguilo
Lic. 2402
QUIMICO LICENCIADO

Quimico II
Nombre / Titulo

Firma

43

Nombre / Titulo

Firma

Nota: El resultado de este análisis se refiere exclusivamante a la muestra analizada.
Este informe solo puede ser reproducido en forma completa y con autorización escrita del Laboratorio Central Caguas.

~~000919~~

RIDAD DE ACUEDUCTOS Y ALCANTARILLADOS
P.O. BOX 5789
CAGUAS PR 00726

: LCDO. JORGE FLECHAS
ce: **POZO RETIRO**
ect Name: PRDOH
lity: CAGUAS CENTRAL LAB.
ription: DRINKING WATER - Grab
nt Ref. #: 05M0965
ID: 3323

ENVIRONMENTAL QUALITY LABORATORIES, INC.

Laboratory Test Report

ple Number:	727685	Collected Date & Time:	07/10/2005 10:40	Date of Report:	7/26/05
k Order:	1502-01-01	Received Date & Time:	07/11/2005 16:00	Collected By:	HSERRANO
very Slip:	2005-06712	Temperature at Arrival:	3 °C	Eqlab Rep.:	ELEVY
er Number:	67166			Proposal Number:	6740 - 1

arks:

(64)

Parameter	Method	Results	Units	Limits LOD	MCL	Analysis Date	Time	By	Prep Method Date	By	Method
ne	EPA 524.2	ND	mg/L	0.000500	0.1	07/16/2005	00:50	JLS	--	--	N/A
chloroethene	EPA 524.2	0.0036	mg/L	0.000500	0.005	07/16/2005	00:50	JLS	--	--	N/A
ne	EPA 524.2	ND	mg/L	0.000500	1	07/16/2005	00:50	JLS	--	--	N/A
1,2-Dichloroethene	EPA 524.2	ND	mg/L	0.000500	0.1	07/16/2005	00:50	JLS	--	--	N/A
loroethene	EPA 524.2	BDL	mg/L	0.000500	0.005	07/16/2005	00:50	JLS	--	--	N/A
chloride	EPA 524.2	ND	mg/L	0.000500	0.002	07/16/2005	00:50	JLS	--	--	N/A

CARLOS GALINDO VELAZQUEZ
Químico Licenciado

Certified By

0000966

ACCREDITED IN ACC... nelac

ND = Not Detected MCL = Maximum Contaminant Level BDL = Below Detection Limit DN... Ignite LOD = Limit of Detection N/A = Not Applicable
MO = Monitoring Only. All results are calculated on a wet w... unless otherwise stated.

ENVIRONMENTAL QUALITY LABORATORIES, INC. P.O. BOX 11458, SANTURCE, P.R. 00910-1458. TELS. 725-5333, 725-3708

REFERENCE 6

WESTON SOLUTIONS, INC.
SITE ASSESSMENT TEAM 2
PROJECT NOTE

TO: San German Groundwater Contamination File (W.A. No.: 52)
FROM: Dennis J. Foerter, CHMM
DATE: 24 October 2006

SUBJECT: Groundwater Populations – San German Groundwater Contamination

Attached are references compiled to determine the groundwater populations of the portion of the San German Urbano system which includes three interconnected wells. These wells include Retiro, Lola Rodriguez de Tio I, and Lola Rodriguez de Tio II. The references include a telecon note between SAT 2 and a member of the Puerto Rico Aqueduct and Sewer Authority (PRASA), and average household size information obtained from the U.S. Census Bureau website.

Based on the number of connections (i.e., 800) and the average household size for San German obtained from the U.S. Census Bureau (2.85), the approximate number of people served by this system is 2,280 people.

Based on a review of pumpage data from this system, a total of 274,752,000 gallons were pumped by this system in 2005. Based on the amount pumped by each of these three wells during 2005, the following percentages and estimated populations served:

Well	2005 pumpage %	Estimated population served
Lolo Rodriguez de Tio I	24%	547
Lola Rodgriez de Tio II	23%	525
Retiro	53%	1,208
	Total population served:	2,280

Signature/Date [signature] 10/24/06

TELECON NOTE	REGION 2 SITE ASSESSMENT TEAM	
W. O. NO.: 20113.011.001.0023.00	**DATE:** 2 October 2006	**TIME:** 1400
DISTRIBUTION: San German Site Discovery Initiative File		
BETWEEN: Carmen Mendez Puerto Rico Aqueduct and Sewer Authority (PRASA)		**PHONE:** (787) 264-0675
AND: Dennis Foerter, Region 2 SAT 2	**Subject:** San German Urbano System	

Ms. Mendez informed SAT 2 that the San German Urbano system consists of seven wells and two surface water intakes which serve an estimated 25,000 people. The Lola Rodriguez I, Lola Rodriguez II and Retiro Wells were an interconnected system which had approximately 800 connections (i.e., customers) at the time of the closure of the Retiro Well due to contamination. Water from these three wells was pumped to Retiro for treatment prior to distribution. Ms. Mendez stated that the Sambolin Well was closed due to a petroleum odor. Water from the remaining wells and intakes are an interconnected system; water from these wells and intakes are pumped to the San German Filtration Plant for treatment prior to distribution. Ms. Mendez provided the annual pumpage data for each of the sources associated with the San German Urbano system for the year 2005:

Well/Intake	Annual Pumping Output (2005)
Lola Rodriguez de Tio I	67,392,000
Lola Rodriguez de Tio II	62,208,000
Retiro	145,152,000
El Real	77,760,000
Providencia I	88,128,000
Providencia II	103,680,000
Sambolin	51,840,000
Hoconuco Intake	600,000 gallons per day
Rio Cain Intake	400,000 gallons per day

Ms. Mendez had limited information on well depths for the following wells:

Well	Approximate Depth (feet)
Lola Rodriguez de Tio I	85
Lola Rodriguez de Tio II	85
Retiro	90-100
El Real	45

Signature / Date: 10/2/06
Dennis Foerter

TM-P022. Average Household Size: 2000
Universe: **Households**
Data Set: **Census 2000 Summary File 1 (SF 1) 100-Percent Data**
Puerto Rico by County

NOTE: For information on confidentiality protection, nonsampling error, definitions, and count corrections see http://factfinder.census.gov/home/en/datanotes/expsf1u.htm.

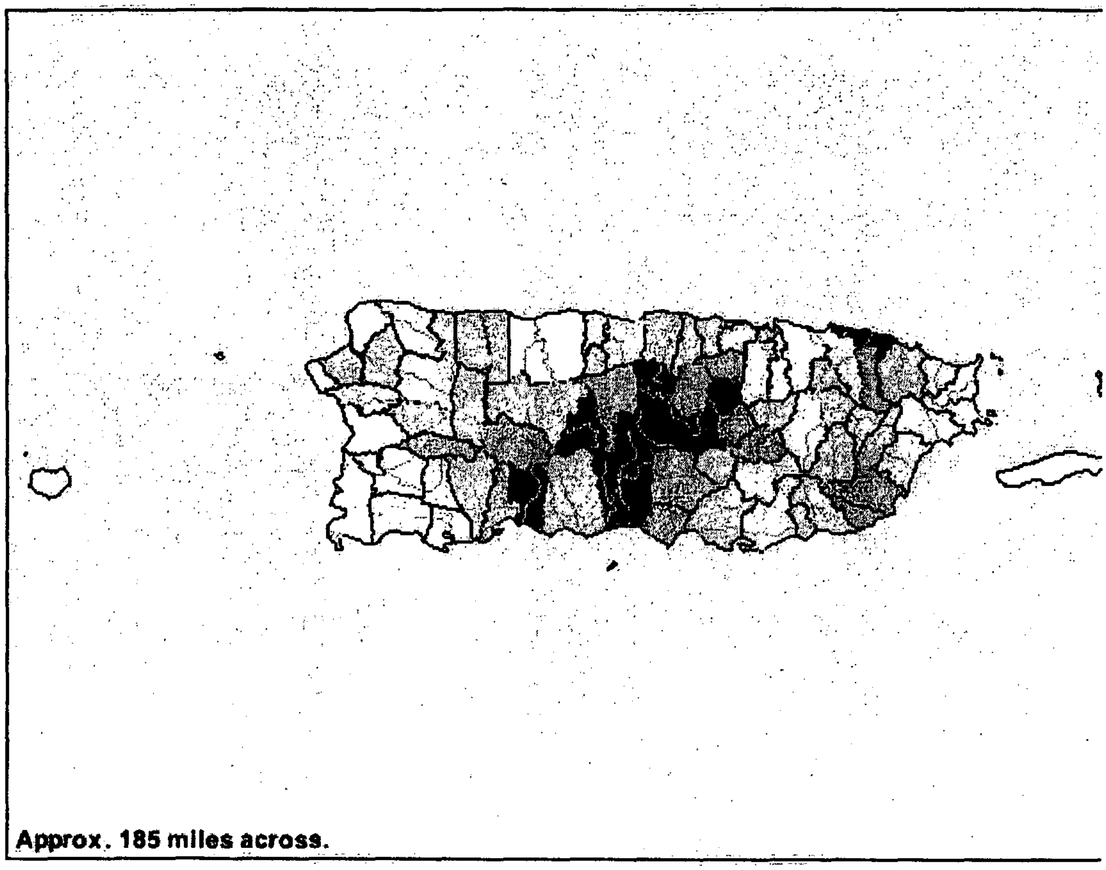
Legend

Data Classes

Persons
2.59 - 2.87
2.91 - 3.03
3.04 - 3.15
3.16 - 3.28
3.31 - 3.55

Features
Major Road
Street
Stream/Waterbody
Stream/Waterbody

Items in gray text are not visible at this zoom level



Source: U.S. Census Bureau, Census 2000 Summary File 1, Matrix P17.

3

Average Household Size

Geography: San Germán Municipio, Puerto Rico
Value: 2.85 Persons

(Puerto Rico: Value: 2.98 Persons)

Close

4

REFERENCE 7

WESTON SOLUTIONS, INC.
SITE ASSESSMENT TEAM 2
PROJECT NOTE

TO: San German Groundwater Contamination File (W.A. No.: 52)
FROM: Dennis J. Foerter, CHMM
DATE: 24 October 2006

SUBJECT: PRDOH Closure / Shutdown Order – Retiro Well

Attached are correspondence between the Puerto Rico Department of Health (PRDOH) and the Puerto Rico Aqueduct and Sewer Authority (PRASA) regarding PRDOH's Closure Order for the Retiro Well due to tetrachloroethylene (PCE) contamination. Since the letters are written in Spanish, also attached are translations of these letters, performed by Julissa Morales of Weston, SAT 2.

Signature/Date 10/24/06

Estado Libre Asociado de Puerto Rico
Departamento de Salud

Oficina de la Secretaria

17 de enero de 2006

Ing. Jorge Rodríguez Ruiz, Presidente
Autoridad de Acueductos y Alcantarillados
Apartado 7066, Bo. Obrero Station
Santurce, Puerto Rico 00916

Re: Orden Administrativa 2006-484-06
Orden de Cierre Pozo Retiro
Sistema: San Germán Urbano (PWS: 3323)

Estimado Ingeniero Rodríguez:

El Pozo Retiro, perteneciente al sistema de San Germán Urbano de la Autoridad de Acueductos y Alcantarillados (AAA), se encuentra bajo una frecuencia de muestreo trimestral para los químicos orgánicos volátiles (VOC, por sus siglas en inglés) al evidenciarse detecciones en o sobre el nivel máximo de detección establecido de 0.0005 mg/L, 40 CFR § 141.24.

Durante el primer trimestre del año 2005 (enero a marzo) el pozo Retiro obtuvo resultados de 0.0050 y 0.0052 mg/L de tetracloroeteno, siendo el nivel máximo de contaminante de 0.005 mg/L. La reglamentación de agua potable establece que para aquellos componentes en frecuencia de muestreo trimestral para VOC, la determinación de cumplimiento está basada en el promedio anual rotativo de cuatro (4) trimestres consecutivos, 40 CFR § 141.24. El promedio anual de tetracloroeteno para el pozo Retiro correspondiente al periodo de octubre 2004 a septiembre 2005, fue de 0.0034 mg/L.

El pasado 14 de octubre de 2005 ocurrió un derrame de diesel en la represa Caín Alto de San Germán impactando el sistema de distribución. A raíz de este incidente se tomaron muestras para VOC en la red de distribución y en los componentes subterráneos del sistema San Germán como parte del muestreo de seguimiento e investigación del caso. Estos muestreos realizados desde el 18 de octubre hasta el 5 de noviembre evidenciaron excedencias al NMC de tetracloroeteno, tanto en el pozo Retiro como en distribución (Ver tabla 1). A nivel regional, personal de la AAA informó a este Departamento que el pozo Retiro se mantendría operando para desagüar solamente, pero no para distribución.

Posteriormente, el 18 de noviembre de 2005, personal de Nivel Central de la AAA solicita a la División de Agua Potable de este Departamento la operación del pozo nuevamente basado en la necesidad de servicio en el sistema y en que los últimos resultados del pozo estaban por debajo del NMC.

Basado en dicha solicitud, este Departamento condiciona la operación del pozo Retiro a que se mantenga un muestreo diario en el pozo y en varios componentes del sistema. De reflejarse alguna excedencia en el pozo, el mismo debía ser sacado de operación inmediatamente como fuente de agua potable.

Este Departamento recibió y evaluó los resultados de los muestreos realizados desde el 17 de noviembre hasta el 18 de diciembre encontrando que a partir del 28 de noviembre el pozo Retiro excedió el NMC para tetracloroeteno en 15 ocasiones. Excedencias también fueron evidenciadas en puntos de distribución del sistema.

Ante el patrón de incumplimiento del pozo Retiro y en nuestro deber ministerial de velar por la pureza de las aguas potables y por ende la salud pública, este Departamento **ordena el cierre del pozo como fuente de agua potable o la instalación de la mejor tecnología de tratamiento para la remoción de tetracloroeteno.**

De incumplir la AAA con lo anteriormente señalado estará sujeta a la aplicación de multas o cualquier otra sanción que establezcan las leyes o reglamentos.

Se requiere contestación a este comunicado en o antes de **cinco (5) días a partir de la fecha de recibo del mismo con la alternativa seleccionada.** De tener alguna duda, favor de comunicarse a la División de Agua Potable, adscrita al Programa de Salud Ambiental del Departamento de Salud, al 787-777-0150.

Atentamente,

Rosa Pérez Perdomo, MD, MPH, PhD
Secretaria de Salud

Anejo: Resumen de Resultados

cf: Ing. Cc l Axel P. Soderberg; Sr. Alfredo Casta Vélez; Sra. Olga I. Rivera; Lcdo. Luis Zayas Mar .uach; Ing. Ayda Mercado; Ing. Rafael Lama; Sra. Irma López; Sr. Antonio Matías; Ing. Rubén González-JCA.

[TRANSLATION FROM SPANISH TO ENGLISH]

January 17, 2006

Engineer Jorge Rodriguez, President
Authority of Aqueducts and Sewer Systems
PO Box 7066, Bo. Obrero Station
Santurce, Puerto Rico 00916

Re: Administrative Order 2006-484-06
Order to Close Retiro Well
System: San German Urbano (PWS: 3323)

Dear Engineer Rodriguez:

The Retiro well, belonging to the San German Urbano System of the Puerto Rico Aqueduct and Sewer Authority (PRASA), is sampled every trimester (quarterly) for volatile organic compounds (VOCs) to detect if the levels are at or higher than the minimum detection limit (MDL) of 0.0005 mg/L per 40 CFR, part 141.24.

During the first trimester of the year 2005 (January to March), the Retiro well obtained results of 0.0050 and 0.0052 mg/L of PCE, exceeding the Maximum Contaminant Level (MCL) of 0.005 mg/L. The drinking water regulation establishes that for those components sampled each trimester (quarterly) for VOCs, the determination of observance must be based on the average of four consecutive trimesters per 40 CFR, part 141.24. The annual average of PCE for the Retiro well that corresponds to the period of October 2004 to September 2005 was 0.0034 mg/L.

This past October 14, 2005, a spill of diesel occurred at the Cain Alto dam of San German, impacting the distribution system. As a result of this incident, samples were collected for VOCs in the distribution network and from the subterranean components of the San German system as part of the sampling for the monitoring and investigation of the case. The samples collected from October 18 to November 5 demonstrate exceedances of the MCL for PCE, both in the well and in the distribution (see table 1). At the regional level, PRASA personnel informed this department that the Retiro well would continue to operate for dewatering only, but not for distribution.

Previously, on November 18, 2005, personnel of the Central Level of PRASA requested to the Division of Drinking Water of this Department to operate the well based on the need to service the system and that the last results of the well were below the MCL.

Based on this request, this Department grants the request of operation of the Retiro well on condition of maintaining a daily sampling log of the well and various components of the system. If any exceedances are observed, the well must immediately be taken out of operation as a source of drinking water.

This Department received and evaluated the sampling results from November 17 to December 18 and found that, as of November 28, the Retiro well exceeded the MCL for PCE on 15 occasions. Exceedances were also observed at points of distribution of the system.

In light of the Retiro well's failure and on our ministerial duty to safeguard the purity of drinking water which constitutes public health, this Department **orders the closure of the well as a source of drinking water or the installation of a better treatment technology for the removal of PCE.**

Failure to comply by PRASA with the above mentioned order will result in fines or whatever other sanctions are established by applicable laws and regulations.

If you wish to reply to this letter you must do so **five days after the date this letter was received along with an alternative solution**. If you have any questions, please contact the Division of Drinking Water, care of the Department of Health's Program of Environmental Health, at 787-777-0150.

Attentively,

Rosa Perez Perdomo, MD, MPH, PhD
Secretary of Health

Attachment: Summary of Results

Autoridad de Acueductos y Alcantarillados
ESTADO LIBRE ASOCIADO DE PUERTO RICO

2 de febrero de 2005

Dra. Rosa Pérez Perdomo, MD, MPH, PhD
Secretaria de Salud
Departamento de Salud
PO BOX 70184
San Juan PR 00936-8184

Estimada doctora Pérez:

RE: ORDEN ADMINISTRATIVA 2006-484-06
ORDEN CIERRE POZO RETIRO
SISTEMA SAN GERMAN URBANO (3323)

En respuesta a su comunicación sobre la Orden en asunto, le informamos que el Pozo Retiro fue sacado fuera de operación el 19 de enero de 2006, inmediatamente luego de tener conocimiento de la orden.

La bomba fue removida el 1 de febrero de 2006.

De tener alguna pregunta se puede comunicar con la Ing. Josefine Molina, Directora Ejecutiva Auxiliar de Cumplimiento, Técnica y Plantas Región Oeste al (787) 658-0655, ó con la Lic. Irma López, Directora Auxiliar – Agua Potable al (787) 620-2277 extensión 2391.

Cordialmente,

Por Marta Ruiz

Ing. Jorge Rodríguez Ruíz
Presidente Ejecutivo

MRR/IML/ARO

c Olga Rivera, Oneida Santiago, Irma López, Josefine Molina, Ariel Rosa – Otero, File San Germán Urbano, Reader File, RDT – 1117.

OA Cierre Pozo Retiro 2006-484-06.doc

7

AM09:31 21 FEB '06 Rcv. A POTABLE

[TRANSLATION FROM SPANISH TO ENGLISH]

February 2, 2005

Dr. Rosa Perez Perdomo, MD, MPH, PhD
Secretary of Health
Department of Health
PO Box 70184
San Juan, PR 00936-8184

Esteemed (Dear) Doctor Perez:

RE: Administrative Order 2006-484-06
Retiro Well Closure Order
San German Urbano System (3323)

In response to your communication regarding the subject Order, we inform you that the Retiro well was taken out of operation on January 19, 2006, immediately after our having knowledge of the order.

The pump was removed February 1, 2006.

If you have any questions you may contact Engineer Josefine Molina, Executive Director of Auxiliary Fulfillment, Technical and Plants East Region at (787) 658-0655, or Attorney Irma Lopez, Auxiliary Director-Drinking Water at (787) 620-2277 extension 2391.

Cordially,

Engineer Jorge Rodriguez Ruiz
Executive President

MRR/IML/ARO

c Olga Rivera, Oneida Santiago, Irma Lopez, Josefine Molina, Ariel Rosa-Otero, File San German Urbano, Reader File, RDT-1117.

OA Retiro Well Closure 2006-484-06.doc

REFERENCE 8

RECORD OF COMMUNICATION

REGIONAL SAMPLE CONTROL CENTER

TDF # 06-0018

DATE: 6/29/2006
SUBJECT: CLP Data Package for Quality Assurance Review
FROM: Hazardous Waste Support Section
TO: ESAT/RSCC

Attached is the following ORGANIC Data Package to be reviewed for Quality Assurance

SITE: San German CASE #: 35465

SDG#: B3RR4 SAMPLER: W-SAT

PROJ. CODE: QB SITE SPILL #: ZZ

#SAMPLES	MATRIX
8	Water

LAB: DATAC OPERABLE UNIT: 00

TURN-AROUND-TIME: 7 day

CERCLIS ID #: N/A FRACTION: Full TCL (SOM01.1)

Contaminant(s) of Concern (If known)

REGION II RSCC DATA TRANSFER LOG

Relinquished By: Signature	Date/Time	Received By: Signature	Date/Time
Ady Michael	7/6/06 11:05am	[signature]	7-6-06 11:05 AM
[signature]	7-12-06 1:15pm	Roberto [signature]	7/12/06 1:15pm
Roberto [signature]	7/12/06 1:50pm	G Karras	7/12/06 1:50pm
G Karras	7/12/06 3pm	Roberto [signature]	7/12/06 3:00pm
Roberto [signature]	7/13/06 2:45pm	C. Stama	7/13/06 1:45pm
C. Stama	7/13/06 1:45pm	Roberto [signature]	7/13/06

CLP DATA ASSESSMENT

Functional Guidelines for Evaluating Organic Analysis

CASE No.: 35465
LABORATORY: DATAC
SAMPLER: W-SAT

SDG No.: B3RR4
SITE: SAN GERMAN
ANALYSIS: TRACE VOA

DATA ASSESSMENT

The current SOP HW-34 (Revision 0) October 2005, USEPA Region II Data Validation SOP for Statement of Work SOM01.1 for evaluating Trace Volatile organic data has been applied.

All data are valid and acceptable except those analytes rejected "R"(unusable). Due to the detection of QC problems, some analytes may have the "J" (estimated), "N"(presumptive evidence for the presence of the material), "U" (non-detect) or "JN" (presumptive evidence for the presence of the material at an estimated value) flag. All action is detailed on the attached sheets.

The "R" flag means that the associated value is unusable. In other words, significant data bias is evident and the reported analyte concentration is unreliable.

Reviewer's Signature: Habteab Ghebreyesus **Date:** July 11, 2006

Verified By: G Farras **Date:** 7 / 12 / 2006

CLP DATA ASSESSMENT

B3RR4

1. HOLDING TIME:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded.

The following action was taken in the samples and analytes shown due to excessive holding time.

No problems found for this qualification.

2. DEUTERATED Monitoring Compounds (DMCs)

All samples are spiked with DMC compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate concentrations were outside contract specifications, qualifications were applied to the samples and analytes as shown below.

The following Trace Volatile samples have surrogate recoveries greater than or equal to 20%, but less than the lower limit. Hits are qualified "J" non-detects are qualified "UJ".

B3RR4
Trichlorofluoromethane, 1,1-Dichloroethene, 1,1,2-Trichloro-1,2,2-trichloroethane, Methyl Acetate, Methyllene Chloride, Methyl tert-Butyl Ether, Carbon Tetrachloride, 1,2-Dichloroethane, 1,1,1-Trichloroethane, 1,2-Dibromoethane

3. MATRIX SPIKE/ MATRIX SPIKE RECOVERY:

The MS/MSDdata is generated to determine the long-term precision and accuracy of the analytical method in various matrices. The MS/MSD may be used in conjunction with other QC criteria for additional qualification of data.

Not applicable.

4. BLANK CONTAMINATION:

Quality assurance (QA) blanks, i.e., method, trip, field, or rinse blanks are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Trip blanks measure cross-contamination of samples during shipment. Field and rinse blanks measure cross-contamination of samples during field operations. Depending on the amount of contamination present in the QA blanks, the analytes are qualified as non-detects, "U". The following analytes in the sample shown were qualified with "U" for these reasons:

A) Method blank contamination:

CLP DATA ASSESSMENT

No contamination in method blank.

B) Field or rinse blank contamination:

No field blank for this SDG.

C) Trip blank contamination:

Blank result >CRQL, sample result >CRQL and <2x blank contamination. Report blank value for sample concentration with a "U".
Chloroform, B3RR4

D) Storage Blank:

No contamination in storage blank.

E) Tics "R" rejected:

None.

5. MASS SPECTROMETER TUNING:

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances. The tuning standard for volatile organics is (BFB) Bromofluorobenzene.

If the mass calibration is in error, all associated data will be classified as unusable "R".

No problems found for this qualification.

6. CALIBRATION:

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration checks document that the instrument is giving satisfactory daily performance.

A) Response Factor GC/MS:

The response factor measures the instrument's response to specific chemical compounds. The response factor for the Target Compound List (TCL) must be ≥ 0.05, and ≥ 0.01 for the fourteen analytes with poor response in both the initial and continuing calibrations. A value < 0.05, or < 0.01 for the poor performers indicates a serious detection and quantitation problem (poor sensitivity). Analytes detected in the sample will be qualified as estimated, "J". All non-detects for that compound will be rejected "R".

CLP DATA ASSESSMENT

The following volatile samples are associated with an initial calibration in which an analyte did not meet average response factor criteria.
Detected compounds are qualified "J" and non-detects are qualified "R".

1,4-Dioxane
B3RR4, B3RR5, B3RR5DL, B3RR6, B3RR7, B3RR8, B3RR9, B3RS0, B3RS8, VBLKT1, VHBLKT1

B) **Percent Relative Standard Deviation (%RSD) and Percent Difference (%D):**

Percent RSD is calculated from the initial calibration and is used to indicate the stability of the specific compound response factor over increasing concentration. Percent D compares the response factor of the continuing calibration check to the mean response factor (RRF) from the initial calibration. Percent D is a measure of the instrument's daily performance. Percent RSD must be ≤ 30% for all TCL analytes, ≤ 40% for poor performers, and ≤ 50% for 1,4-Dioxane. %D must be ≤ 30% for all TCL analytes, ≤ 40% for the poor performers, and ≤ 50% for 1,4-Dioxane. A value outside of these limits indicates potential detection and quantitation errors. For these reasons, all positive results are flagged as estimated, "J" and non-detects are flagged "UJ". If %RSD and %D grossly exceed QC criteria, non-detects data may be qualified "R".

No problems found for this qualification.

7. INTERNAL STANDARDS PERFORMANCE GC/MS:

Internal standards (IS) performance criteria ensure that the GC/MS sensitivity and response are stable during every experimental run. The internal standard area count must not vary by more than 40% from the associated continuing calibration standard area. The retention time of the internal standard must not vary more than 20 seconds from the associated continuing calibration standard. If the area count is greater the 40% range of the associated standard, all of the positive results for compounds quantitated using that IS are qualified as estimated "J", and all non-detects are not flagged. If the area count is less than the 40% range of the associated standard, all of the positive results for compounds quantitated with that IS are qualified as estimated "J", and all non-detects are qualified as unusable "R".

No problems found for this qualification.

If an internal standard retention time varies by more than 20 seconds, the reviewer will use professional judgment to determine either partial or total rejection of the data for that sample fraction.

8. COMPOUND IDENTIFICATION:

A) Trace Volatile Fractions:

TCL compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and by comparison to the ion spectra obtained from known standards. For the results to be a positive hit, the

sample peak must be within 0.06 RRT units of the standard compound and have an ion spectra which has a ratio of the primary and secondary m/e intensities within 20% of that in the standard compound. For the tentatively identified compounds (TIC) the ion spectra must match accurately. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

No problems.

9. CONTRACT PROBLEMS NON-COMPLIANCE:

TRACE:

1,4-Dioxane - Average response factor (RRF) is below contractual criteria in **initial calibration.**

1,4-Dioxane – Continuing response factor RF5.0 is below Contractual criteria in the **opening** CCV calibrations.

1,4-Dioxane – Continuing response factor RF5.0 is below Contractual criteria in the **closing** CCV calibrations.

10. FIELD DOCUMENTATION:

11. OTHER PROBLEMS:

12. This package contains reextractions, reanalyses or dilutions. Upon reviewing the QA results, the following Form 1(s) are identified not to be used.

DATA CHEM
LABORATORIES
A SORENSON COMPANY

RECEIVED
JUN 28 2006
HAZ. WASTE SUPPORT SEC.

SDG Narrative
Trace Volatiles

Contract: EPW05026
Case: 35465
SDG: B3RR4
Laboratory Name: Datachem Laboratories
Sample No:

EPA Sample No.	DCL Sample ID.	pH	Dilution
B3RR3	06C02951	1	
B3RS8	06C02952	1	
B3RR5	06C02953	1	
B3RR5DL	06C02953DL	1	1:2
B3RR6	06C02954	1	
B3RR7	06C02955	1	
B3RR8	06C02956	5	
B3RR9	06C02957	1	
B3RS0	06C02958	1	

General SDG Information: Samples were analyzed according to USEPA CLP Statement of Work SOM01.1. There were no deviations from the SOW except as listed below.

Instrumentation: Hewlett Packard 5971-M GC/MSD with electron impact ionization and quadrupole detector scanning at a mass range of 35 to 300 amu. Column: J&W Scientific DB624 - 75meters, 0.53 mm id., 3 um film
Temperature Program: *10°C (2.0 min) 8°/min ramp to 180° (0.1 min) 30°/min ramp to 220° *Cryogenically cooled with liquid nitrogen
Carrier Gas: Helium Purge Gas: Helium
Purge and Trap Device: Varian Archon autosampler/Tekmar Dynamic Headspace Concentrator /LSC 2000
Purge Flow: 35 mL/min Trap: Vocarb 3000 Trap Temp: 35°C

Sample Preparation: This method has no extraction procedure for the water matrix. Twenty - five milliliters of water sample was spiked with Internal Standard/DMC Solution and purged.

Instrument Calibration: The GC/MS was hardware tuned to meet the criteria for a 50 ng purging of 4-Bromofluorobenzene as specified in the SOW. This tune check is valid for 12 hours.

Initial and Continuing Calibration Verification: The five point initial calibration curve, which is used for the quantitation of each target compound , met the specified criteria in the SOW except for the minimum RRF for the dioxanes. Due to an interfering ion from 1,2-Dichloropropane, a secondary ion of 55 was used for the quantitation of Methylcyclohexane for all calibrations, blanks, and samples analyzed on 5971-M. A continuing calibration standard

7

(CCAL) was analyzed prior to sample analysis. A final calibration standard (FCAL) was analyzed after each analytical clock. All calibration standards met all method criteria as specified in the SOW except for the for the dioxanes. Manual edits were made in the calibration standards and in some samples for various mis-called peaks. Every manual integration is noted by an "m" footnote on the quantitation report, and an additional graphics page is included for each manual integration to show how the peak was integrated. Analytes that required manual integrations are listed.

Sample	Initial Scan	Final Scan	Analyte
VSTD0.5TM	1914	1956	1,4-Dichlorobenzene
VSTD0.5TM	1981	2021	1,2-Dichlorobenzene
VSTD001TM	1912	1945	1,4-Dichlorobenzene
VSTD010TM	1976	2023	1,2-Dichlorobenzene

Blank Analysis: Method blanks were prepared using 25 mL of spiked reagent water. The blanks were analyzed prior to sample analysis and were free of volatile organic contaminants within the specifications of the SOW.

Sample Analysis: All deuterated monitoring compounds and internal standard area responses were within the required acceptance criteria. All samples were analyzed within ten days of verified sample receipt. Sample B3RR5 was diluted to bring Chloroform within the range of the curve.

MS/MSD Analysis: As per region 2, no MS/MSD required.

Miscellaneous Comments: As instructed in the SOW, alkanes are not reported separately on the Form 1J but rather are summarized as "total alkanes."

With regard to the naming of tentatively-identified compounds (TICs), spectral matches above 85 percent are reported as a specific isomer unless the analyst has a specific reason to assign a different name. The exact isomer configuration, as reported, may not be absolutely accurate. Reasons for assigning a TIC name other than the match with the highest fit value above 85% include: instances in which the analyst has previous experience with respect to a specific compound; when the first computer-generated match is a target compound and retention time information clearly indicates the TIC is in fact not the target compound; and when a specific compound name has already been assigned to a peak. Even though specific names will usually be given to TICs with spectral fits above 85%, it must be understood by the data user that TIC names are very tentative, and it cannot be assumed that the specific isomers reported are correct.

8

I certify that this Sample Data Package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy Sample Data Package and in the electronic data deliverable has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

June 26, 2006

Joseph Gress
Chemist
Volatile Organic Analysis Section

9

DATA CHEM
LABORATORIES
A SORENSON COMPANY

RECEIVED
JUN 28 2006
HAZ. WASTE SUPPORT SEC.

SDG Narrative
Semivolatiles Fraction

Contract: EP-W-05-026
Case: 35465
SDG: B3RR4
Laboratory Name: DataChem Laboratories
DCL Set ID.: 06C-0310-02
Sample No.: B3RR4, B3RR5, B3RR6, B3RR7, B3RR8, B3RR9, B3RS0

General SDG Information: Samples were analyzed according to USEPA CLP Statement of Work SOM01.0. There are no deviations from the SOW.

Instrumentation: Hewlett-Packard 5973 GC/MS system
Column: J&W Scientific DB-5ms column, 95% dimethyl-(5%)-diphenylsiloxane, nonpolar
30 m x 0.32 mm I.D. with a 0.50 μm film thickness

Sample Preparation: Samples were prepared as stated in the SOW.

Instrument Calibration: (i.e.DFTPP tunes) All tunes met ion intensity ratio requirements. All samples and standards were analyzed within the twelve hour tune period.

Initial and Continuing Calibration Verification: Initial and continuing calibration standards met minimum response factor, RSD and %D criteria.

Blank Analysis: The extraction blank met method criteria.

Sample Analysis: All samples passed internal standard area and DMC recovery QC critieria.

MS/MSD Analysis: Matrix spiking was not requested on this SDG.

Dilutions: No sample dilutions were necessary.

Miscellaneous Comments: Manual edits were made in the calibration standards for a variety of miscalled peaks. Every manual integration is noted by an "m" footnote on the quantitation report, and an additional graphics page is included for each manual integration to show how the peak was integrated. These graphics pages are reported as an attachment to this case narrative and are also included with the raw data. These graphics pages are reproduced with the case narrative in order to satisfy the requirements of Exhibit B Section 2.5.1 which asks for a listing of each instance of manual integration. The explanation for each of these manual integrations is that the data system did not correctly integrate the peak in its automated data evaluation procedure.

10

With regard to the naming of tentatively-identified compounds (TICs), spectral matches above 85 percent are reported as a specific isomer unless the analyst has a specific reason to assign a different name. Reasons for assigning a TIC name other than the match with the highest fit value above 85% include instances in which the analyst has previous experience with respect to a specific compound. When the first computer-generated match is a target compound and retention time information clearly indicates the TIC is in fact not the target compound, the analyst reserves the right to give a more appropriate tentative identification. There may be instances in which a specific compound name is assigned to more than one peak. Even though specific names will usually be given to TICs with spectral fits above 85%, it must be understood by the data user that TIC names are very tentative, and it cannot be assumed that the specific isomers reported are correct. One case where specific names are not given to spectral matches above 85% is for alkanes, because the SOW requires alkanes to be reported as either straight-chain, branched or cyclic and summarized as "total alkanes."

Results on the raw data are expressed in units of ug/mL (micrograms per milliliter of the solution that was injected onto the GC/MS system). Final results are calculated by the following equations:

Water: (Raw conc) ug/mL * (final extract volume) mL * (Dilution Factor) / (liters extracted) L

Soil: (Raw conc.) ug/mL * (final volume) mL * (GPC factor) * (Dilution Factor) / [(kg extracted)kg * (percent solid)]

I certify that this Sample Data Package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy Sample Data Package and in the electronic data deliverable has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

6-27-0

Reed A. Hendricks — Date

GC/MS Semivolatile Analysis Section

11

DATA CHEM LABORATORIES

RECEIVED
JUN 28 2006
HAZ. WASTE SUPPORT SEC.

SDG Narrative
Pesticides

Laboratory Name: DataChem Laboratories
Case: 35465
SDG: B3RR4
EPA Sample Numbers: B3RR4, B3RR4MS, B3RR4MSD, B3RR5, B3RR6, B3RR7, B3RR8, B3RR9, B3RS0.

Contract Number: EP-W-05-026

General SDG Information: Samples were analyzed according to USEPA CLP Statement of Work SOM01.1. All above samples are billable.

Instrumentation: Hewlett Packard 5890 GC/ECD
Column: 0.32m ID X 30M RTX-CLP 0.50 micron film (primary).
0.32m ID X 30M RTX-CLP2 0.25 micron film (confirmation).

Sample Preparation: All samples were extracted within SOW specified hold times.

Initial Calibration: All requirements for initial calibration were met.

Continuing Calibration: Surrogate DCB in the final CCVs (INDC341, INCD342) failed low. All samples passed surrogate recovery criteria so the samples were not re-analyzed.

Sample Analysis: All samples were analyzed within SOW specified hold times.

Dilutions: No dilutions were required.

Blank Analysis: No analytes were detected in the method blank above the CRQLs.

LCS Analysis: All LCS recoveries were within established limits

MS/MSD Analysis: MS and MSD were performed on sample B3RR4. Aldrin was out high in the MS on the RTXCLP2 column.

Surrogates: All samples passed SOW surrogate criteria.

Miscellaneous Comments: None.

12

This chart summarizes the amount (ng) of each compound in each type of standard:

	RESC##	PEM##	TOXAPH1##	TOXAPH2##	TOXAPH3##	TOXAPH4##	TOXAPH5##	INDC1##	INDC2##	INDC3##	INDC4##	INDC5##	PIBLK##
alpha-BHC	0.04	0.02						0.01	0.02	0.04	0.08	0.20	
beta-BHC	0.04	0.02						0.01	0.02	0.04	0.08	0.20	
delta-BHC	0.04							0.01	0.02	0.04	0.08	0.20	
gamma-BHC	0.04	0.02						0.01	0.02	0.04	0.08	0.20	
Heptachlor	0.04							0.01	0.02	0.04	0.08	0.20	
Aldrin	0.04							0.01	0.02	0.04	0.08	0.20	
Heptachlor epoxide	0.04							0.01	0.02	0.04	0.08	0.20	
Endosulfan I	0.04							0.01	0.02	0.04	0.08	0.20	
Dieldrin	0.08							0.02	0.04	0.08	0.16	0.40	
4,4'-DDE	0.08							0.02	0.04	0.08	0.16	0.40	
Endrin	0.08	0.1						0.02	0.04	0.08	0.16	0.40	
Endosulfan II	0.08							0.02	0.04	0.08	0.16	0.40	
4,4'-DDD	0.08							0.02	0.04	0.08	0.16	0.40	
Endosulfan sulfate	0.08							0.02	0.04	0.08	0.16	0.40	
4,4'-DDT	0.08	0.2						0.02	0.04	0.08	0.16	0.40	
Methoxychlor	0.40	0.5						0.10	0.2	0.4	0.8	2.0	
Endrin ketone	0.08							0.02	0.04	0.08	0.16	0.40	
Endrin aldehyde	0.08							0.02	0.04	0.08	0.16	0.40	
alpha-Chlordane	0.04							0.01	0.02	0.04	0.08	0.20	
gamma-Chlordane	0.04							0.01	0.02	0.04	0.08	0.20	
Toxaphene			1	2	4	8	20						
Tetrachloro-m-xylene	0.04	0.04	0.01	0.02	0.04	0.08	0.20	0.01	0.02	0.04	0.08	0.20	0.04
Decachlorobiphenyl	0.08	0.04	0.02	0.04	0.08	0.16	0.40	0.02	0.04	0.08	0.16	0.40	0.08

Sample equation for Endrin in PLCSW1 (1):

$$\text{Result ug/L} = \frac{(\text{Area response of analyte})(\text{Extract FV mL})}{(\text{Ave CF})(\text{Liters of Sample})(\text{uL injected})}$$

$$0.095\ \text{ug/L} = \frac{(8970)(10\ \text{mL})}{(472000)(1\ \text{L})(2\ \text{uL})}$$

I certify that this Sample Data Package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the electronic data deliverable has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

06/26/06

Steven J. Sagers
Pesticide Chemist

Date

13

DATA CHEM
LABORATORIES

SDG Narrative
Aroclors

Laboratory Name: DataChem Laboratories
Case: 35465
SDG: B3RR4
EPA Sample Numbers: B3RR4, B3RR4MS, B3RR4MSD, B3RR5, B3RR6, B3RR7, B3RR8, B3RR9, and B3RS0.
Contract Number: EP-W-05-026

General SDG Information: Samples were analyzed according to USEPA CLP Statement of Work SOM01.1. All of the samples listed above are billable.

Instrumentation: Hewlett Packard 5890 GC/ECD
Column: 0.32m ID X 30M RTX-CLP 0.50 micron film (primary).
0.32m ID X 30M RTX-CLP2 0.25 micron film (confirmation).

Sample Preparation: All samples were extracted within SOW specified hold times.

Initial Calibration: All requirements for initial calibration were met.

Continuing Calibration: All requirements for continuing calibration were met.

Sample Analysis: All samples were analyzed within SOW specified hold times.

Dilutions: No dilutions were required.

Blank Analysis: No analytes were detected in the method blank above the CRQL.

LCS Analysis: All recoveries were within established limits.

MS/MSD Analysis: All recoveries were within established limits.

Surrogates: All surrogate recoveries were within established limits.

Miscellaneous Comments: None.

14

This chart summarizes the amount (ng) of each compound in each type of standard:

	AR12213##	AR12323##	AR12423##	AR12483##	AR12543##	AR12623##	AR12683##	AR16601##	AR16602##	AR16603##	AR16604##	AR16605##	AIBLK##
AR1221	0.8												
AR1232		0.8											
AR1242			0.8										
AR1248				0.8									
AR1254					0.8								
AR1262						0.8							
AR1268							0.8						
AR1016								0.2	0.4	0.8	1.6	3.2	
AR1260								0.2	0.4	0.8	1.6	3.2	
Tetrachloro-m-xylene	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.01	0.02	0.04	0.08	0.20	0.04
Decachlorobiphenyl	0.08	0.08	0.08	0.08	0.08	0.08	0.40	0.02	0.04	0.08	0.16	0.40	0.08

Sample equation for individual aroclor peak AR1016-1 in ALCSW (1):

$$\text{Result ug/L} = \frac{\text{(Area response of analyte)(Extract FV mL)(DF)}}{\text{(Ave CF)(Liters of Sample)(uL injected)}}$$

$$0.995 \text{ ug/L} = \frac{(13456)(10 \text{ mL})(1)}{(67600)(1 \text{ L})(2 \text{ uL})}$$

The result of five peaks for AR1016 in ALCSW (1) is the average of the five results:

$$0.952 \text{ ug/L} = \frac{(0.996)+(1.07)+(0.876)+(0.866)+(0.952)}{5}$$

I certify that this Sample Data Package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the electronic data deliverable has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

6/26/06

Robert B. Copenhafer | Date
Chemist

(15)

SAMPLE DELIVERY GROUP (SDG)
TRAFFIC REPORT (TR) COVER SHEET

Lab Name: DataChem Laboratories, Inc. Contract No.: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Delivery Order No. C2

Full Sample Analysis Price in Contract: N/A

SDG No./First Sample in SDG: B3RR4 Sample Receipt Date: 06/21/06
(Lowest EPA Sample Number in first shipment received under SDG.)

Last Sample in SDG: B3RS8 Sample Receipt Date: 06/21/06
(Highest EPA Sample Number in last shipment of samples received under SDG.)

EPA Sample Numbers in the SDG (listed in alphanumeric order):

1.	B3RR4	11.	
2.	B3RR5	12.	
3.	B3RR6	13.	
4.	B3RR7	14.	
5.	B3RR8	15.	
6.	B3RR9	16.	
7.	B3RS0	17.	
8.	B3RS8	18.	
9.	6/21/06	19.	6/21/06
10.		20.	

Note: There are a maximum of 20 field samples in an SDG.

Attach Traffic Reports to this form in alphanumeric order (i.e., the order listed on this form).

Justin Pate
Sample Receiving

6/21/2006
Date

16

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

GWO1

EPA SAMPLE NO.

B3RR4

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02951

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: MH91C951

Level: (TRACE/LOW/MED) TRACE Date Received: 06/21/2006

% Moisture: not dec. Date Analyzed: 06/22/2006

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl chloride	0.50	U
74-83-9	Bromomethane	0.50	U
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U J
75-35-4	1,1-Dichloroethene	0.50	U J
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U J
67-64-1	Acetone	5.0	U
75-15-0	Carbon disulfide	0.50	U
79-20-9	Methyl acetate	0.50	U J
75-09-2	Methylene chloride	0.50	U J
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-butyl ether	0.41	~~J~~ J
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	1.5	
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	1.4 ~~0.61~~	U
71-55-6	1,1,1-Trichloroethane	0.50	U J
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon tetrachloride	0.50	U J
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U J
123-91-1	1,4-Dioxane	20	~~X~~ R

(17)

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

GW01

EPA SAMPLE NO.

B3RR4

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: ______ SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02951

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: MH91C951

Level: (TRACE/LOW/MED) TRACE Date Received: 06/21/2006

% Moisture: not dec. ______ Date Analyzed: 06/22/2006

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ______ (uL) Soil Aliquot Volume: ______ (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
79-01-6	Trichloroethene	0.54	
108-87-2	Methylcyclohexane	0.50	U
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-Pentanone	5.0	U
108-88-3	Toluene	0.50	U
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	0.50	U
127-18-4	Tetrachloroethene	1.6	
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	UJ
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
95-47-6	o-Xylene	0.50	U
179601-23-1	m,p-Xylene	0.50	U
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

18

6w01

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3RR4

Lab Name: DataChem Laboratories, Inc.   Contract: EP-W-05-026

Lab Code: DATAC   Case No.: 35465   Mod. Ref No.: ______   SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER   Lab Sample ID: 06C02951

Sample wt/vol: 25.0 (g/mL) mL   Lab File ID: MH91C951

Level: (TRACE/LOW/MED) TRACE   Date Received: 06/21/2006

% Moisture: not dec. ______   Date Analyzed: 06/22/2006

GC Column: DB624   ID: 0.53 (mm)   Dilution Factor: 1.0

Soil Extract Volume: ______ (uL)   Soil Aliquot Volume: ______ (uL)

CONCENTRATION UNITS: (ug/L or ug/kg) ug/L   Purge Volume: 25.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
	E966796[1]	Total Alkanes	N/A		

[1] EPA-designated Registry Number.

19

GW02

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR5

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02953

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: MH95C953

Level: (TRACE/LOW/MED) TRACE Date Received: 06/21/2006

% Moisture: not dec. Date Analyzed: 06/22/2006

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl chloride	0.50	U
74-83-9	Bromomethane	0.50	U
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon disulfide	0.50	U
79-20-9	Methyl acetate	0.50	U
75-09-2	Methylene chloride	0.26	J
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-butyl ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	0.17	J
67-66-3	Chloroform	+ 28 ~~31~~	~~E~~
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon tetrachloride	0.50	U
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U
123-91-1	1,4-Dioxane	20	~~U~~ R

+ transferred from dilution.

20

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

6W02

EPA SAMPLE NO.

B3RR5

Lab Name: DataChem Laboratories, Inc.   Contract: EP-W-05-026

Lab Code: DATAC   Case No.: 35465   Mod. Ref No.: ______   SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER   Lab Sample ID: 06C02953

Sample wt/vol: 25.0 (g/mL) mL   Lab File ID: MH95C953

Level: (TRACE/LOW/MED) TRACE   Date Received: 06/21/2006

% Moisture: not dec. ______   Date Analyzed: 06/22/2006

GC Column: DB624   ID: 0.53 (mm)   Dilution Factor: 1.0

Soil Extract Volume: ______ (uL)   Soil Aliquot Volume: ______ (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
79-01-6	Trichloroethene	0.50	U
108-87-2	Methylcyclohexane	0.50	U
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	12	
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-Pentanone	5.0	U
108-88-3	Toluene	0.50	U
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	0.50	U
127-18-4	Tetrachloroethene	0.14	J
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	4.4	
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
95-47-6	o-Xylene	0.50	U
179601-23-1	m,p-Xylene	0.50	U
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.33	J
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

21

GW02

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RR5

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02953

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: MH95C953

Level: (TRACE/LOW/MED) TRACE Date Received: 06/21/2006

% Moisture: not dec. Date Analyzed: 06/22/2006

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/kg) ug/L Purge Volume: 25.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
	E966796[1]	Total Alkanes	N/A		

[1]EPA-designated Registry Number.

22

GW03

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR6

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: ____ SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02954

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: MH92C954

Level: (TRACE/LOW/MED) TRACE Date Received: 06/21/2006

% Moisture: not dec. ____ Date Analyzed: 06/22/2006

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ____ (uL) Soil Aliquot Volume: ____ (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl chloride	0.50	U
74-83-9	Bromomethane	0.50	U
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon disulfide	0.50	U
79-20-9	Methyl acetate	0.50	U
75-09-2	Methylene chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-butyl ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	0.50	U
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon tetrachloride	0.50	U
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U
123-91-1	1,4-Dioxane	20	~~U~~ R

23

Gw03

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR6

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02954

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: MH92C954

Level: (TRACE/LOW/MED) TRACE Date Received: 06/21/2006

% Moisture: not dec. Date Analyzed: 06/22/2006

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
79-01-6	Trichloroethene	0.50	U
108-87-2	Methylcyclohexane	0.50	U
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-Pentanone	5.0	U
108-88-3	Toluene	0.50	U
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	0.50	U
127-18-4	Tetrachloroethene	0.50	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
95-47-6	o-Xylene	0.50	U
179601-23-1	m,p-Xylene	0.50	U
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

24

GW03

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RR6

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02954

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: MH92C954

Level: (TRACE/LOW/MED) TRACE Date Received: 06/21/2006

% Moisture: not dec. Date Analyzed: 06/22/2006

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/kg) ug/L Purge Volume: 25.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
	E966796[1]	Total Alkanes	N/A		

[1] EPA-designated Registry Number.

(25)

Gw04

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR7

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: ______ SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02955

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: MH93C955

Level: (TRACE/LOW/MED) TRACE Date Received: 06/21/2006

% Moisture: not dec. ______ Date Analyzed: 06/22/2006

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ______ (uL) Soil Aliquot Volume: ______ (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl chloride	0.50	U
74-83-9	Bromomethane	0.50	U
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon disulfide	0.50	U
79-20-9	Methyl acetate	0.50	U
75-09-2	Methylene chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-butyl ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	0.50	U
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon tetrachloride	0.50	U
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U
123-91-1	1,4-Dioxane	20	~~U~~ R

26

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

6W04

EPA SAMPLE NO.

B3RR7

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02955

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: MH93C955

Level: (TRACE/LOW/MED) TRACE Date Received: 06/21/2006

% Moisture: not dec. Date Analyzed: 06/22/2006

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
79-01-6	Trichloroethene	0.50	U
108-87-2	Methylcyclohexane	0.50	U
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-Pentanone	5.0	U
108-88-3	Toluene	0.50	U
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	0.50	U
127-18-4	Tetrachloroethene	0.50	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
95-47-6	o-Xylene	0.50	U
179601-23-1	m,p-Xylene	0.50	U
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

27

GW04

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RR7

Lab Name: DataChem Laboratories, Inc.   Contract: EP-W-05-026

Lab Code: DATAC   Case No.: 35465   Mod. Ref No.:   SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER   Lab Sample ID: 06C02955

Sample wt/vol: 25.0 (g/mL) mL   Lab File ID: MH93C955

Level: (TRACE/LOW/MED) TRACE   Date Received: 06/21/2006

% Moisture: not dec.   Date Analyzed: 06/22/2006

GC Column: DB624   ID: 0.53 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/kg) ug/L   Purge Volume: 25.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
	E966796[1]	Total Alkanes	N/A		

[1]EPA-designated Registry Number.

28

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

6W05

EPA SAMPLE NO.

B3RR8

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02956

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: MH94C956

Level: (TRACE/LOW/MED) TRACE Date Received: 06/21/2006

% Moisture: not dec. Date Analyzed: 06/22/2006

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl chloride	0.50	U
74-83-9	Bromomethane	0.50	U
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon disulfide	0.50	U
79-20-9	Methyl acetate	0.50	U
75-09-2	Methylene chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-butyl ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	0.50	U
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon tetrachloride	0.50	U
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U
123-91-1	1,4-Dioxane	20	~~U~~ R

29

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

GWDS

EPA SAMPLE NO.

B3RR8

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02956

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: MH94C956

Level: (TRACE/LOW/MED) TRACE Date Received: 06/21/2006

% Moisture: not dec. Date Analyzed: 06/22/2006

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
79-01-6	Trichloroethene	0.50	U
108-87-2	Methylcyclohexane	0.50	U
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-Pentanone	5.0	U
108-88-3	Toluene	0.50	U
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	0.50	U
127-18-4	Tetrachloroethene	0.50	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
95-47-6	o-Xylene	0.50	U
179601-23-1	m,p-Xylene	0.50	U
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

30

6w05

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RR8

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: ______ SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02956

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: MH94C956

Level: (TRACE/LOW/MED) TRACE Date Received: 06/21/2006

% Moisture: not dec. ______ Date Analyzed: 06/22/2006

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ______ (uL) Soil Aliquot Volume: ______ (uL)

CONCENTRATION UNITS: (ug/L or ug/kg) ug/L Purge Volume: 25.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
	E966796[1]	Total Alkanes	N/A		

[1]EPA-designated Registry Number.

(31)

Gw06

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR9

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02957

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: MH96C957

Level: (TRACE/LOW/MED) TRACE Date Received: 06/21/2006

% Moisture: not dec. Date Analyzed: 06/22/2006

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl chloride	0.50	U
74-83-9	Bromomethane	0.50	U
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon disulfide	0.50	U
79-20-9	Methyl acetate	0.50	U
75-09-2	Methylene chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-butyl ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	0.50	U
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon tetrachloride	0.50	U
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U
123-91-1	1,4-Dioxane	20	~~U~~ R

32

6w06

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR9

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02957

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: MH96C957

Level: (TRACE/LOW/MED) TRACE Date Received: 06/21/2006

% Moisture: not dec. Date Analyzed: 06/22/2006

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
79-01-6	Trichloroethene	0.50	U
108-87-2	Methylcyclohexane	0.50	U
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-Pentanone	5.0	U
108-88-3	Toluene	0.50	U
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	0.50	U
127-18-4	Tetrachloroethene	0.50	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
95-47-6	o-Xylene	0.50	U
179601-23-1	m,p-Xylene	0.50	U
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

33

6W06

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RR9

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02957

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: MH96C957

Level: (TRACE/LOW/MED) TRACE Date Received: 06/21/2006

% Moisture: not dec. Date Analyzed: 06/22/2006

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/kg) ug/L Purge Volume: 25.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
	E966796[1]	Total Alkanes	N/A		

[1] EPA-designated Registry Number.

34

Gw07

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RS0

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02958

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: MH97C958

Level: (TRACE/LOW/MED) TRACE Date Received: 06/21/2006

% Moisture: not dec. Date Analyzed: 06/22/2006

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl chloride	0.50	U
74-83-9	Bromomethane	0.50	U
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon disulfide	0.50	U
79-20-9	Methyl acetate	0.50	U
75-09-2	Methylene chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-butyl ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	0.50	U
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon tetrachloride	0.50	U
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U
123-91-1	1,4-Dioxane	20	~~U~~ R

35

6w07

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RS0

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02958

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: MH97C958

Level: (TRACE/LOW/MED) TRACE Date Received: 06/21/2006

% Moisture: not dec. Date Analyzed: 06/22/2006

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
79-01-6	Trichloroethene	0.50	U
108-87-2	Methylcyclohexane	0.50	U
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-Pentanone	5.0	U
108-88-3	Toluene	0.50	U
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	0.50	U
127-18-4	Tetrachloroethene	0.50	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
95-47-6	o-Xylene	0.50	U
179601-23-1	m,p-Xylene	0.50	U
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

36

Gw07

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RS0

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02958

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: MH97C958

Level: (TRACE/LOW/MED) TRACE Date Received: 06/21/2006

% Moisture: not dec. Date Analyzed: 06/22/2006

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/kg) ug/L Purge Volume: 25.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
	E966796[1]	Total Alkanes	N/A		

[1] EPA-designated Registry Number.

37

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Tb B3RS8

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02952

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: MH98C952

Level: (TRACE/LOW/MED) TRACE Date Received: 06/21/2006

% Moisture: not dec. Date Analyzed: 06/22/2006

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl chloride	0.50	U
74-83-9	Bromomethane	0.50	U
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon disulfide	0.50	U
79-20-9	Methyl acetate	0.50	U
75-09-2	Methylene chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-butyl ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	1.4	
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon tetrachloride	0.50	U
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U
123-91-1	1,4-Dioxane	20	~~U~~ R

38

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

JB B3RS8

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02952

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: MH98C952

Level: (TRACE/LOW/MED) TRACE Date Received: 06/21/2006

% Moisture: not dec. Date Analyzed: 06/22/2006

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
79-01-6	Trichloroethene	0.50	U
108-87-2	Methylcyclohexane	0.50	U
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-Pentanone	5.0	U
108-88-3	Toluene	0.50	U
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	0.50	U
127-18-4	Tetrachloroethene	0.50	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
95-47-6	o-Xylene	0.50	U
179601-23-1	m,p-Xylene	0.50	U
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

39

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

TB B3RS8

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02952

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: MH98C952

Level: (TRACE/LOW/MED) TRACE Date Received: 06/21/2006

% Moisture: not dec. Date Analyzed: 06/22/2006

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/kg) ug/L Purge Volume: 25.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
	E966796[1]	Total Alkanes	N/A		

[1] EPA-designated Registry Number.

40

Functional Guidelines for Evaluating Organic Analysis

CASE No.: 35465
LABORATORY: DATAC
SAMPLER: W-SAT

SDG No.: B3RR4
SITE: SAN GERMAN
ANALYSIS: BNA

DATA ASSESSMENT

The current SOP HW-33B/SVOA (Revision 0) December 2005, USEPA Region II Data Validation SOP for Statement of Work SOM01.1 for evaluating organic data have been applied.

All data are valid and acceptable except those analytes rejected "R"(unusable). Due to the detection of QC problems, some analytes may have the "J" (estimated), "N"(presumptive evidence for the presence of the material, "U" (non-detect) or "JN" (presumptive evidence for the presence of the material at an estimated value) flag. All action is detailed on the attached sheets.

The "R" flag means that the associated value is unusable. In other words, significant data bias is evident and the reported analyte concentration is unreliable.

Reviewer's
Signature: Habteab Ghebreyesus

Date: July 11, 2006

Verified By:

Date: 7 / 12 / 2006

SDG#B3RR4

1. HOLDING TIME:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded.
The following action was taken in the samples and analytes shown due to excessive holding time.

No problems found for this qualification.

2. SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate concentrations were outside contract specifications, qualifications were applied to the samples and analytes as shown below.

The following Semi-volatile samples have surrogate percent recoveries lower than the acceptance limit. Detected associated compounds are qualified "J" and non-detects are qualified "UJ".

B3RR4
Benzaldehyde, Phenol, bis(2-Chloroethyl)ether, 2,2'oxybis(1-Chloropropane), bis(2-Chloroethoxy)methane

B3RS0
2-Nitroaniline, 3-Nitroaniline, 2,4-Dinitrophenol, 4-Nitrophenol, 4-Nitroaniline,

3. MATRIX SPIKE/SPIKE DUPLICATE, MS/MSD:

The MS/MSD data are generated to determine the long-term precision and accuracy of the analytical method in various matrices. The MS/MSD may be used in conjunction with other QC criteria for additional qualification of data.

Not Applicable.

4. BLANK CONTAMINATION:

Quality assurance (QA) blanks, i.e., method, trip, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Trip blanks measure cross-contamination of samples during shipment. Field and rinse blanks measure cross-contamination of samples during field operations. If the concentration of the analyte is less than 5 times the blank contaminant level (10 times for common contaminants), the analytes are qualified as non-detects, "U". The following analytes in the sample shown were qualified with "U" for these reasons:

A) Method blank contamination:

DC-x The following Semivolatile samples have analyte concentrations reported below the CRQL. The associated method blank concentration is also less than the CRQL. Reported sample concentrations have been elevated to the CRQL and qualified "U".

Di-n-butylphthalate, B3RR4, B3RR5, B3RR7, B3RR8, B3RR9, B3RS0
Butylbenzylphthalate, B3RR4, B3RR5, B3RR6, B3RR7, B3RR8, B3RR9, B3RS0

DC-x The following Semivolatile samples have analyte concentrations reported below the CRQL. The associated method blank concentration is greater than the CRQL. Reported sample concentrations have been elevated to the CRQL and qualified "U".

Bis(2-ethylhexyl)phthalate, B3RR4, B3RR5, B3RR6, B3RR7, B3RR8, B3RR9, B3RS0

B) Field or rinse blank contamination:

No field blank for this SDG.

C) Trip blank contamination for VOA aqueous samples:

Not Applicable.

D) Storage Blank associated with VOA samples only

Not Applicable.

E) Tics "R" rejected:

Unknown alcohol, B3RR4
Polycyclic hydrocarbon, B3RR4
2-Propanol, 1-(2-methoxy-1-methylethoxy), B3RR6

5. MASS SPECTROMETER TUNING:

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances. The tuning standard for volatile organics is (BFB) Bromofluorobenzene and for semi-volatiles Decafluorotriphenyl-phosphine (DFTPP).

If the mass calibration is in error, all associated data will be classified as unusable "R".

No problems found for this qualification.

6. CALIBRATION:

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration checks document that the instrument is giving satisfactory daily performance.

A) Response Factor GC/MS:

The response factor measures the instrument's response to specific chemical compounds. The

response factor for the Target Compound List (TCL) must be ≥ 0.05 in both initial and continuing calibrations. A value < 0.05 indicates a serious detection and quantitation problem (poor sensitivity). Analytes detected in the sample will be qualified as estimated, "J". All non-detects for that compound will be rejected "R".

No problems found for this qualification.

B) Percent Relative Standard Deviation (%RSD) and Percent Difference (%D):

Percent RSD is calculated from the initial calibration and is used to indicate the stability of the specific compound response factor over increasing concentration. Percent D compares the response factor of the continuing calibration check to the mean response factor (RRF) from the initial calibration. Percent D is a measure of the instrument's daily performance. Percent RSD must be < 30% and %D must be < 25%. A value outside of these limits indicates potential detection and quantitation errors. For these reasons, all positive results are flagged as estimated, "J" and non-detects are flagged "UJ". If %RSD and %D grossly exceed QC criteria, non-detects data may be qualified "R".

The following analytes in the sample shown were qualified for %RSD and %D:

The following semivolatile samples are associated with a continuing calibration percent difference (%D) outside primary criteria. Hits are qualified "J" and non-detects are qualified "UJ".

B3RR4, SBLK99
Pentachlorophenol

B3RR5, B3RR6, B3RR7, B3RR8, B3RR9, SBLK81
Pyrene

8. INTERNAL STANDARDS PERFORMANCE GC/MS:

Internal standards (IS) performance criteria ensure that the GC/MS sensitivity and response are stable during every experimental run. The internal standard area count must not vary by more than a factor of 2 (-50% to +100%) from the associated continuing calibration standard. The retention time of the internal standard must not vary more than ±30 seconds from the associated continuing calibration standard. If the area count is outside the (-50% to +100%) range of the associated standard, all of the positive results for compounds quantitated using that IS are qualified as estimated, "J", and all non-detects as "UJ", or "R" if there is a severe loss of sensitivity.

If an internal standard retention time varies by more than 30 seconds, the reviewer will use professional judgment to determine either partial or total rejection of the data for that sample fraction.

No problems found for this qualification.

9. COMPOUND IDENTIFICATION:

A) Semi-Volatile Fractions:

TCL compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and by comparison to the ion spectra obtained from known standards. For the results to be a positive hit, the sample peak must be within ± 0.06 RRT units of the standard compound and have an ion spectra which

has a ratio of the primary and secondary m/e intensities within 20% of that in the standard compound. For the tentatively identified compounds (TIC) the ion spectra must match accurately. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

No problems found for this qualification.

10. CONTRACT PROBLEMS NON-COMPLIANCE:

11. FIELD DOCUMENTATION:

12. OTHER PROBLEMS

13. This package contains reextractions, reanalyses or dilutions. Upon reviewing the QA results, the following Form 1(s) are identified NOT to be used.

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Gw01

EPA SAMPLE NO.

B3RR4

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02951

Sample wt/vol: 1000 (g/mL) mL Lab File ID: RNS03C51

Level: (LOW/MED) LOW Extraction: (Type) CONT

% Moisture: Decanted: (Y/N) Date Received: 06/21/2006

Concentrated Extract Volume: 1000 (uL) Date Extracted: 06/23/2006

Injection Volume: 1.0 (uL) GPC Factor: Date Analyzed: 06/26/2006

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
100-52-7	Benzaldehyde	0.27	J
108-95-2	Phenol	0.31	J
111-44-4	Bis(2-chloroethyl)ether	5.0	U J
95-57-8	2-Chlorophenol	2.6	J
95-48-7	2-Methylphenol	5.0	U
108-60-1	2,2'-Oxybis(1-chloropropane)	5.0	U J
98-86-2	Acetophenone	5.0	U
106-44-5	4-Methylphenol	5.0	U
621-64-7	N-Nitroso-di-n-propylamine	5.0	U
67-72-1	Hexachloroethane	5.0	U
98-95-3	Nitrobenzene	5.0	U
78-59-1	Isophorone	5.0	U
88-75-5	2-Nitrophenol	5.0	U
105-67-9	2,4-Dimethylphenol	5.0	U
111-91-1	Bis(2-chloroethoxy)methane	5.0	U J
120-83-2	2,4-Dichlorophenol	5.0	U
91-20-3	Naphthalene	5.0	U
106-47-8	4-Chloroaniline	5.0	U
87-68-3	Hexachlorobutadiene	5.0	U
105-60-2	Caprolactam	5.0	U
59-50-7	4-Chloro-3-methylphenol	5.0	U
91-57-6	2-Methylnaphthalene	5.0	U
77-47-4	Hexachlorocyclopentadiene	5.0	U
88-06-2	2,4,6-Trichlorophenol	5.0	U
95-95-4	2,4,5-Trichlorophenol	5.0	U
92-52-4	1,1'-Biphenyl	5.0	U
91-58-7	2-Chloronaphthalene	5.0	U
88-74-4	2-Nitroaniline	10	U
131-11-3	Dimethylphthalate	5.0	U
606-20-2	2,6-Dinitrotoluene	5.0	U
208-96-8	Acenaphthylene	5.0	U
99-09-2	3-Nitroaniline	10	U
83-32-9	Acenaphthene	5.0	U

46

6wo1

1E - FORM I SV-2
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR4

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: ______ SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02951

Sample wt/vol: 1000 (g/mL) mL Lab File ID: RNS03C51

Level: (LOW/MED) LOW Extraction: (Type) CONT

% Moisture: ______ Decanted: (Y/N) ______ Date Received: 06/21/2006

Concentrated Extract Volume: 1000 (uL) Date Extracted: 06/23/2006

Injection Volume: 1.0 (uL) GPC Factor: ______ Date Analyzed: 06/26/2006

GPC Cleanup: (Y/N) N pH: ______ Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
51-28-5	2,4-Dinitrophenol	10	U
100-02-7	4-Nitrophenol	10	U
132-64-9	Dibenzofuran	5.0	U
121-14-2	2,4-Dinitrotoluene	5.0	U
84-66-2	Diethylphthalate	0.57	J
86-73-7	Fluorene	5.0	U
7005-72-3	4-Chlorophenyl-phenylether	5.0	U
100-01-6	4-Nitroaniline	10	U
534-52-1	4,6-Dinitro-2-methylphenol	10	U
86-30-6	N-Nitrosodiphenylamine[1]	5.0	U
95-94-3	1,2,4,5-Tetrachlorobenzene	5.0	U
101-55-3	4-Bromophenyl-phenylether	5.0	U
118-74-1	Hexachlorobenzene	5.0	U
1912-24-9	Atrazine	5.0	U
87-86-5	Pentachlorophenol	10	UJ
85-01-8	Phenanthrene	5.0	U
120-12-7	Anthracene	5.0	U
86-74-8	Carbazole	5.0	U
84-74-2	Di-n-butylphthalate	5.0 ~~0.81~~	~~JB~~ U
206-44-0	Fluoranthene	5.0	U
129-00-0	Pyrene	5.0	U
85-68-7	Butylbenzylphthalate	5.0 ~~0.57~~	~~JB~~ U
91-94-1	3,3'-Dichlorobenzidine	5.0	U
56-55-3	Benzo(a)anthracene	5.0	U
218-01-9	Chrysene	5.0	U
117-81-7	Bis(2-ethylhexyl)phthalate	5.0 ~~1.8~~	~~JB~~ U
117-84-0	Di-n-octylphthalate	5.0	U
205-99-2	Benzo(b)fluoranthene	5.0	U
207-08-9	Benzo(k)fluoranthene	5.0	U
50-32-8	Benzo(a)pyrene	5.0	U
193-39-5	Indeno(1,2,3-cd)pyrene	5.0	U
53-70-3	Dibenzo(a,h)anthracene	5.0	U
191-24-2	Benzo(g,h,i)perylene	5.0	U
58-90-2	2,3,4,6-Tetrachlorophenol	5.0	U

[1]Cannot be separated from Diphenylamine

47

6w01

1K - FORM I SV-TIC
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RR4

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: ____ SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02951

Sample wt/vol: 1000 (g/mL) mL Lab File ID: RNS03C51

Level: (LOW/MED) LOW Extraction: (Type) CONT

% Moisture: ____ Decanted: (Y/N) ____ Date Received: 06/21/2006

Concentrated Extract Volume: 1000 (uL) Date Extracted: 06/23/2006

Injection Volume: 1.0 (uL) GPC Factor: ____ Date Analyzed: 06/26/2006

GPC Cleanup: (Y/N) N pH: ____ Dilution Factor: 1.0

CONCENTRATION UNITS: (ug/L or ug/kg) ug/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01	1-11-9	Ethanol, 2-(2-ethoxyethoxy)-	4.46	66	JN
02		Unknown alcohol	4.54	27	~~JB~~ R
03		Unknown aromatic	12.28	8.6	J
04		Polycyclic hydrocarbon	14.42	2.3	J
05		Unknown oxyhydrocarbon	15.81	4.9	J
06		Polycyclic hydrocarbon	18.87	30	~~JB~~ R
07		Polycyclic hydrocarbon	24.25	24	~~JB~~
08		Unknown alcohol	25.28	5.9	J
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
	E966796[2]	Total Alkanes	N/A		

[2]EPA-designated Registry Number.

48

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

6w02

EPA SAMPLE NO.

B3RR5

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: ______ SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02953

Sample wt/vol: 1000 (g/mL) mL Lab File ID: RNP05C53

Level: (LOW/MED) LOW Extraction: (Type) CONT

% Moisture: ______ Decanted: (Y/N) ______ Date Received: 06/21/2006

Concentrated Extract Volume: 1000 (uL) Date Extracted: 06/21/2006

Injection Volume: 1.0 (uL) GPC Factor: ______ Date Analyzed: 06/23/2006

GPC Cleanup: (Y/N) N pH: ______ Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
100-52-7	Benzaldehyde	5.0	U
108-95-2	Phenol	5.0	U
111-44-4	Bis(2-chloroethyl)ether	5.0	U
95-57-8	2-Chlorophenol	5.0	U
95-48-7	2-Methylphenol	5.0	U
108-60-1	2,2'-Oxybis(1-chloropropane)	5.0	U
98-86-2	Acetophenone	5.0	U
106-44-5	4-Methylphenol	5.0	U
621-64-7	N-Nitroso-di-n-propylamine	5.0	U
67-72-1	Hexachloroethane	5.0	U
98-95-3	Nitrobenzene	5.0	U
78-59-1	Isophorone	5.0	U
88-75-5	2-Nitrophenol	5.0	U
105-67-9	2,4-Dimethylphenol	5.0	U
111-91-1	Bis(2-chloroethoxy)methane	5.0	U
120-83-2	2,4-Dichlorophenol	5.0	U
91-20-3	Naphthalene	5.0	U
106-47-8	4-Chloroaniline	5.0	U
87-68-3	Hexachlorobutadiene	5.0	U
105-60-2	Caprolactam	5.0	U
59-50-7	4-Chloro-3-methylphenol	5.0	U
91-57-6	2-Methylnaphthalene	5.0	U
77-47-4	Hexachlorocyclopentadiene	5.0	U
88-06-2	2,4,6-Trichlorophenol	5.0	U
95-95-4	2,4,5-Trichlorophenol	5.0	U
92-52-4	1,1'-Biphenyl	5.0	U
91-58-7	2-Chloronaphthalene	5.0	U
88-74-4	2-Nitroaniline	10	U
131-11-3	Dimethylphthalate	5.0	U
606-20-2	2,6-Dinitrotoluene	5.0	U
208-96-8	Acenaphthylene	5.0	U
99-09-2	3-Nitroaniline	10	U
83-32-9	Acenaphthene	5.0	U

49

6w02

1E - FORM I SV-2
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR5

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: ______ SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02953

Sample wt/vol: 1000 (g/mL) mL Lab File ID: RNP05C53

Level: (LOW/MED) LOW Extraction: (Type) CONT

% Moisture: ______ Decanted: (Y/N) ______ Date Received: 06/21/2006

Concentrated Extract Volume: 1000 (uL) Date Extracted: 06/21/2006

Injection Volume: 1.0 (uL) GPC Factor: ______ Date Analyzed: 06/23/2006

GPC Cleanup: (Y/N) N pH: ______ Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
51-28-5	2,4-Dinitrophenol	10	U
100-02-7	4-Nitrophenol	10	U
132-64-9	Dibenzofuran	5.0	U
121-14-2	2,4-Dinitrotoluene	5.0	U
84-66-2	Diethylphthalate	0.20	J
86-73-7	Fluorene	5.0	U
7005-72-3	4-Chlorophenyl-phenylether	5.0	U
100-01-6	4-Nitroaniline	10	U
534-52-1	4,6-Dinitro-2-methylphenol	10	U
86-30-6	N-Nitrosodiphenylamine[1]	5.0	U
95-94-3	1,2,4,5-Tetrachlorobenzene	5.0	U
101-55-3	4-Bromophenyl-phenylether	5.0	U
118-74-1	Hexachlorobenzene	5.0	U
1912-24-9	Atrazine	5.0	U
87-86-5	Pentachlorophenol	10	U
85-01-8	Phenanthrene	5.0	U
120-12-7	Anthracene	5.0	U
86-74-8	Carbazole	5.0	U
84-74-2	Di-n-butylphthalate	5.0 ~~0.44~~	~~JB~~ U
206-44-0	Fluoranthene	5.0	U
129-00-0	Pyrene	5.0	U J
85-68-7	Butylbenzylphthalate	5.0 ~~0.73~~	~~JB~~ U
91-94-1	3,3'-Dichlorobenzidine	5.0	U
56-55-3	Benzo(a)anthracene	5.0	U
218-01-9	Chrysene	5.0	U
117-81-7	Bis(2-ethylhexyl)phthalate	5.0 ~~4.5~~	~~JB~~ U
117-84-0	Di-n-octylphthalate	5.0	U
205-99-2	Benzo(b)fluoranthene	5.0	U
207-08-9	Benzo(k)fluoranthene	5.0	U
50-32-8	Benzo(a)pyrene	5.0	U
193-39-5	Indeno(1,2,3-cd)pyrene	5.0	U
53-70-3	Dibenzo(a,h)anthracene	5.0	U
191-24-2	Benzo(g,h,i)perylene	5.0	U
58-90-2	2,3,4,6-Tetrachlorophenol	5.0	U

[1]Cannot be separated from Diphenylamine

50

GW02

1K - FORM I SV-TIC
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.: B3RR5

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02953

Sample wt/vol: 1000 (g/mL) mL Lab File ID: RNP05C53

Level: (LOW/MED) LOW Extraction: (Type) CONT

% Moisture: Decanted: (Y/N) Date Received: 06/21/2006

Concentrated Extract Volume: 1000 (uL) Date Extracted: 06/21/2006

Injection Volume: 1.0 (uL) GPC Factor: Date Analyzed: 06/23/2006

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CONCENTRATION UNITS: (ug/L or ug/kg) ug/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01	1638-16-0	2-Propanol, 1,1'-[(1-methyl-1,2-ethanedi	4.55	10	JN
02	100013-91-0	7,9-Di-tert-butyl-1-oxaspiro(4,5)deca-6,	12.30	3.1	JN
03	544-85-4	Dotriacontane	17.07	2.4	JN
04	85-44-9	Phthalic anhydride	18.91	39	JN
05	4616-63-1	1H-Isoindole-1,3(2H)-dione, 2-(2-propyny	24.30	54	JN
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
	E966796[2]	Total Alkanes	N/A		

[2]EPA-designated Registry Number.

6W03

1D - FORM I SV-1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR6

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: ______ SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02954

Sample wt/vol: 1000 (g/mL) mL Lab File ID: RNP06C54

Level: (LOW/MED) LOW Extraction: (Type) CONT

% Moisture: ______ Decanted: (Y/N) ______ Date Received: 06/21/2006

Concentrated Extract Volume: 1000 (uL) Date Extracted: 06/21/2006

Injection Volume: 1.0 (uL) GPC Factor: ______ Date Analyzed: 06/23/2006

GPC Cleanup: (Y/N) N pH: ______ Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
100-52-7	Benzaldehyde	5.0	U
108-95-2	Phenol	5.0	U
111-44-4	Bis(2-chloroethyl)ether	5.0	U
95-57-8	2-Chlorophenol	5.0	U
95-48-7	2-Methylphenol	5.0	U
108-60-1	2,2'-Oxybis(1-chloropropane)	5.0	U
98-86-2	Acetophenone	5.0	U
106-44-5	4-Methylphenol	5.0	U
621-64-7	N-Nitroso-di-n-propylamine	5.0	U
67-72-1	Hexachloroethane	5.0	U
98-95-3	Nitrobenzene	5.0	U
78-59-1	Isophorone	5.0	U
88-75-5	2-Nitrophenol	5.0	U
105-67-9	2,4-Dimethylphenol	5.0	U
111-91-1	Bis(2-chloroethoxy)methane	5.0	U
120-83-2	2,4-Dichlorophenol	5.0	U
91-20-3	Naphthalene	5.0	U
106-47-8	4-Chloroaniline	5.0	U
87-68-3	Hexachlorobutadiene	5.0	U
105-60-2	Caprolactam	5.0	U
59-50-7	4-Chloro-3-methylphenol	5.0	U
91-57-6	2-Methylnaphthalene	5.0	U
77-47-4	Hexachlorocyclopentadiene	5.0	U
88-06-2	2,4,6-Trichlorophenol	5.0	U
95-95-4	2,4,5-Trichlorophenol	5.0	U
92-52-4	1,1'-Biphenyl	5.0	U
91-58-7	2-Chloronaphthalene	5.0	U
88-74-4	2-Nitroaniline	10	U
131-11-3	Dimethylphthalate	5.0	U
606-20-2	2,6-Dinitrotoluene	5.0	U
208-96-8	Acenaphthylene	5.0	U
99-09-2	3-Nitroaniline	10	U
83-32-9	Acenaphthene	5.0	U

52

GW03

1E - FORM I SV-2
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR6

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: ________ SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02954

Sample wt/vol: 1000 (g/mL) mL Lab File ID: RNP06C54

Level: (LOW/MED) LOW Extraction: (Type) CONT

% Moisture: ________ Decanted: (Y/N) ______ Date Received: 06/21/2006

Concentrated Extract Volume: 1000 (uL) Date Extracted: 06/21/2006

Injection Volume: 1.0 (uL) GPC Factor: ________ Date Analyzed: 06/23/2006

GPC Cleanup: (Y/N) N pH: ________ Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
51-28-5	2,4-Dinitrophenol	10	U
100-02-7	4-Nitrophenol	10	U
132-64-9	Dibenzofuran	5.0	U
121-14-2	2,4-Dinitrotoluene	5.0	U
84-66-2	Diethylphthalate	5.0	U
86-73-7	Fluorene	5.0	U
7005-72-3	4-Chlorophenyl-phenylether	5.0	U
100-01-6	4-Nitroaniline	10	U
534-52-1	4,6-Dinitro-2-methylphenol	10	U
86-30-6	N-Nitrosodiphenylamine[1]	5.0	U
95-94-3	1,2,4,5-Tetrachlorobenzene	5.0	U
101-55-3	4-Bromophenyl-phenylether	5.0	U
118-74-1	Hexachlorobenzene	5.0	U
1912-24-9	Atrazine	5.0	U
87-86-5	Pentachlorophenol	10	U
85-01-8	Phenanthrene	5.0	U
120-12-7	Anthracene	5.0	U
86-74-8	Carbazole	5.0	U
84-74-2	Di-n-butylphthalate	5.0	U
206-44-0	Fluoranthene	5.0	U
129-00-0	Pyrene	5.0	U J
85-68-7	Butylbenzylphthalate	5.0 ~~0.34~~	~~JB~~ U
91-94-1	3,3'-Dichlorobenzidine	5.0	U
56-55-3	Benzo(a)anthracene	5.0	U
218-01-9	Chrysene	5.0	U
117-81-7	Bis(2-ethylhexyl)phthalate	5.0 ~~3.0~~	~~JB~~ U
117-84-0	Di-n-octylphthalate	5.0	U
205-99-2	Benzo(b)fluoranthene	5.0	U
207-08-9	Benzo(k)fluoranthene	5.0	U
50-32-8	Benzo(a)pyrene	5.0	U
193-39-5	Indeno(1,2,3-cd)pyrene	5.0	U
53-70-3	Dibenzo(a,h)anthracene	5.0	U
191-24-2	Benzo(g,h,i)perylene	5.0	U
58-90-2	2,3,4,6-Tetrachlorophenol	5.0	U

[1]Cannot be separated from Diphenylamine

6w03

1K - FORM I SV-TIC
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RR6

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: ______ SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02954

Sample wt/vol: 1000 (g/mL) mL Lab File ID: RNP06C54

Level: (LOW/MED) LOW Extraction: (Type) CONT

% Moisture: ______ Decanted: (Y/N) ______ Date Received: 06/21/2006

Concentrated Extract Volume: 1000 (uL) Date Extracted: 06/21/2006

Injection Volume: 1.0 (uL) GPC Factor: ______ Date Analyzed: 06/23/2006

GPC Cleanup: (Y/N) N pH: ______ Dilution Factor: 1.0

CONCENTRATION UNITS: (ug/L or ug/kg) ug/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01	20324-32-7	2-Propanol, 1-(2-methoxy-1-methylethoxy)	4.55	6.8	~~JNB~~ R
02	52898-79-0	3-(2,6-Dimethoxyphenyl)-2-methyl-4(3H)-q	18.91	23	JN
03	4767-63-9	3-Ethylideneisobenzofuranon	24.29	38	JN
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
	E966796[2]	Total Alkanes	N/A		

[2]EPA-designated Registry Number.

54

1D - FORM I SV-1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

6604

EPA SAMPLE NO.

B3RR7

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: ______ SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02955

Sample wt/vol: 1000 (g/mL) mL Lab File ID: RNP07C55

Level: (LOW/MED) LOW Extraction: (Type) CONT

% Moisture: ______ Decanted: (Y/N) ______ Date Received: 06/21/2006

Concentrated Extract Volume: 1000 (uL) Date Extracted: 06/21/2006

Injection Volume: 1.0 (uL) GPC Factor: ______ Date Analyzed: 06/23/2006

GPC Cleanup: (Y/N) N pH: ______ Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
100-52-7	Benzaldehyde	5.0	U
108-95-2	Phenol	5.0	U
111-44-4	Bis(2-chloroethyl)ether	5.0	U
95-57-8	2-Chlorophenol	0.28	J
95-48-7	2-Methylphenol	5.0	U
108-60-1	2,2'-Oxybis(1-chloropropane)	5.0	U
98-86-2	Acetophenone	5.0	U
106-44-5	4-Methylphenol	5.0	U
621-64-7	N-Nitroso-di-n-propylamine	5.0	U
67-72-1	Hexachloroethane	5.0	U
98-95-3	Nitrobenzene	5.0	U
78-59-1	Isophorone	5.0	U
88-75-5	2-Nitrophenol	5.0	U
105-67-9	2,4-Dimethylphenol	5.0	U
111-91-1	Bis(2-chloroethoxy)methane	5.0	U
120-83-2	2,4-Dichlorophenol	5.0	U
91-20-3	Naphthalene	5.0	U
106-47-8	4-Chloroaniline	5.0	U
87-68-3	Hexachlorobutadiene	5.0	U
105-60-2	Caprolactam	5.0	U
59-50-7	4-Chloro-3-methylphenol	5.0	U
91-57-6	2-Methylnaphthalene	5.0	U
77-47-4	Hexachlorocyclopentadiene	5.0	U
88-06-2	2,4,6-Trichlorophenol	5.0	U
95-95-4	2,4,5-Trichlorophenol	5.0	U
92-52-4	1,1'-Biphenyl	5.0	U
91-58-7	2-Chloronaphthalene	5.0	U
88-74-4	2-Nitroaniline	10	U
131-11-3	Dimethylphthalate	5.0	U
606-20-2	2,6-Dinitrotoluene	5.0	U
208-96-8	Acenaphthylene	5.0	U
99-09-2	3-Nitroaniline	10	U
83-32-9	Acenaphthene	5.0	U

6w04

1E - FORM I SV-2
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR7

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: ______ SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02955

Sample wt/vol: 1000 (g/mL) mL Lab File ID: RNP07C55

Level: (LOW/MED) LOW Extraction: (Type) CONT

% Moisture: ______ Decanted: (Y/N) ______ Date Received: 06/21/2006

Concentrated Extract Volume: 1000 (uL) Date Extracted: 06/21/2006

Injection Volume: 1.0 (uL) GPC Factor: ______ Date Analyzed: 06/23/2006

GPC Cleanup: (Y/N) N pH: ______ Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
51-28-5	2,4-Dinitrophenol	10	U
100-02-7	4-Nitrophenol	10	U
132-64-9	Dibenzofuran	5.0	U
121-14-2	2,4-Dinitrotoluene	5.0	U
84-66-2	Diethylphthalate	5.0	U
86-73-7	Fluorene	5.0	U
7005-72-3	4-Chlorophenyl-phenylether	5.0	U
100-01-6	4-Nitroaniline	10	U
534-52-1	4,6-Dinitro-2-methylphenol	10	U
86-30-6	N-Nitrosodiphenylamine[1]	5.0	U
95-94-3	1,2,4,5-Tetrachlorobenzene	5.0	U
101-55-3	4-Bromophenyl-phenylether	5.0	U
118-74-1	Hexachlorobenzene	5.0	U
1912-24-9	Atrazine	5.0	U
87-86-5	Pentachlorophenol	10	U
85-01-8	Phenanthrene	5.0	U
120-12-7	Anthracene	5.0	U
86-74-8	Carbazole	5.0	U
84-74-2	Di-n-butylphthalate	5.0 ~~0.28~~	~~JB~~ U
206-44-0	Fluoranthene	5.0	U
129-00-0	Pyrene	5.0	UJ
85-68-7	Butylbenzylphthalate	5.0 ~~0.59~~	~~JB~~ U
91-94-1	3,3'-Dichlorobenzidine	5.0	U
56-55-3	Benzo(a)anthracene	5.0	U
218-01-9	Chrysene	5.0	U
117-81-7	Bis(2-ethylhexyl)phthalate	5.0 ~~3.1~~	~~JB~~ U
117-84-0	Di-n-octylphthalate	5.0	U
205-99-2	Benzo(b)fluoranthene	5.0	U
207-08-9	Benzo(k)fluoranthene	5.0	U
50-32-8	Benzo(a)pyrene	5.0	U
193-39-5	Indeno(1,2,3-cd)pyrene	5.0	U
53-70-3	Dibenzo(a,h)anthracene	5.0	U
191-24-2	Benzo(g,h,i)perylene	5.0	U
58-90-2	2,3,4,6-Tetrachlorophenol	5.0	U

[1] Cannot be separated from Diphenylamine

56

1K - FORM I SV-TIC
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

6w04

EPA SAMPLE NO.

B3RR7

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02955

Sample wt/vol: 1000 (g/mL) mL Lab File ID: RNP07C55

Level: (LOW/MED) LOW Extraction: (Type) CONT

% Moisture: Decanted: (Y/N) Date Received: 06/21/2006

Concentrated Extract Volume: 1000 (uL) Date Extracted: 06/21/2006

Injection Volume: 1.0 (uL) GPC Factor: Date Analyzed: 06/23/2006

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CONCENTRATION UNITS: (ug/L or ug/kg) ug/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01	629-14-1	Ethane, 1,2-diethoxy-	4.55	8.3	JN
02	85-44-9	Phthalic anhydride	18.91	23	JN
03	85-44-9	Phthalic anhydride	24.30	35	JN
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
	E966796[2]	Total Alkanes	N/A		

[2]EPA-designated Registry Number.

57

6w05

1D - FORM I SV-1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR8

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: ______ SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02956

Sample wt/vol: 1000 (g/mL) mL Lab File ID: RNP08C56

Level: (LOW/MED) LOW Extraction: (Type) CONT

% Moisture: ______ Decanted: (Y/N) ______ Date Received: 06/21/2006

Concentrated Extract Volume: 1000 (uL) Date Extracted: 06/21/2006

Injection Volume: 1.0 (uL) GPC Factor: ______ Date Analyzed: 06/23/2006

GPC Cleanup: (Y/N) N pH: ______ Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
100-52-7	Benzaldehyde	0.23	J
108-95-2	Phenol	5.0	U
111-44-4	Bis(2-chloroethyl)ether	5.0	U
95-57-8	2-Chlorophenol	5.0	U
95-48-7	2-Methylphenol	5.0	U
108-60-1	2,2'-Oxybis(1-chloropropane)	5.0	U
98-86-2	Acetophenone	5.0	U
106-44-5	4-Methylphenol	5.0	U
621-64-7	N-Nitroso-di-n-propylamine	5.0	U
67-72-1	Hexachloroethane	5.0	U
98-95-3	Nitrobenzene	5.0	U
78-59-1	Isophorone	5.0	U
88-75-5	2-Nitrophenol	5.0	U
105-67-9	2,4-Dimethylphenol	5.0	U
111-91-1	Bis(2-chloroethoxy)methane	5.0	U
120-83-2	2,4-Dichlorophenol	5.0	U
91-20-3	Naphthalene	5.0	U
106-47-8	4-Chloroaniline	5.0	U
87-68-3	Hexachlorobutadiene	5.0	U
105-60-2	Caprolactam	5.0	U
59-50-7	4-Chloro-3-methylphenol	5.0	U
91-57-6	2-Methylnaphthalene	5.0	U
77-47-4	Hexachlorocyclopentadiene	5.0	U
88-06-2	2,4,6-Trichlorophenol	5.0	U
95-95-4	2,4,5-Trichlorophenol	5.0	U
92-52-4	1,1'-Biphenyl	5.0	U
91-58-7	2-Chloronaphthalene	5.0	U
88-74-4	2-Nitroaniline	10	U
131-11-3	Dimethylphthalate	5.0	U
606-20-2	2,6-Dinitrotoluene	5.0	U
208-96-8	Acenaphthylene	5.0	U
99-09-2	3-Nitroaniline	10	U
83-32-9	Acenaphthene	5.0	U

6w05

1E - FORM I SV-2
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR8

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02956

Sample wt/vol: 1000 (g/mL) mL Lab File ID: RNP08C56

Level: (LOW/MED) LOW Extraction: (Type) CONT

% Moisture: Decanted: (Y/N) Date Received: 06/21/2006

Concentrated Extract Volume: 1000 (uL) Date Extracted: 06/21/2006

Injection Volume: 1.0 (uL) GPC Factor: Date Analyzed: 06/23/2006

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
51-28-5	2,4-Dinitrophenol	10	U
100-02-7	4-Nitrophenol	10	U
132-64-9	Dibenzofuran	5.0	U
121-14-2	2,4-Dinitrotoluene	5.0	U
84-66-2	Diethylphthalate	5.0	U
86-73-7	Fluorene	5.0	U
7005-72-3	4-Chlorophenyl-phenylether	5.0	U
100-01-6	4-Nitroaniline	10	U
534-52-1	4,6-Dinitro-2-methylphenol	10	U
86-30-6	N-Nitrosodiphenylamine[1]	5.0	U
95-94-3	1,2,4,5-Tetrachlorobenzene	5.0	U
101-55-3	4-Bromophenyl-phenylether	5.0	U
118-74-1	Hexachlorobenzene	5.0	U
1912-24-9	Atrazine	5.0	U
87-86-5	Pentachlorophenol	10	U
85-01-8	Phenanthrene	5.0	U
120-12-7	Anthracene	5.0	U
86-74-8	Carbazole	5.0	U
84-74-2	Di-n-butylphthalate	5.0 ~~0.37~~	~~JB~~ U
206-44-0	Fluoranthene	5.0	U
129-00-0	Pyrene	5.0	U J
85-68-7	Butylbenzylphthalate	5.0 ~~0.64~~	~~JB~~ U
91-94-1	3,3'-Dichlorobenzidine	5.0	U
56-55-3	Benzo(a)anthracene	5.0	U
218-01-9	Chrysene	5.0	U
117-81-7	Bis(2-ethylhexyl)phthalate	5.0 ~~3.5~~	~~JB~~ U
117-84-0	Di-n-octylphthalate	5.0	U
205-99-2	Benzo(b)fluoranthene	5.0	U
207-08-9	Benzo(k)fluoranthene	5.0	U
50-32-8	Benzo(a)pyrene	5.0	U
193-39-5	Indeno(1,2,3-cd)pyrene	5.0	U
53-70-3	Dibenzo(a,h)anthracene	5.0	U
191-24-2	Benzo(g,h,i)perylene	5.0	U
58-90-2	2,3,4,6-Tetrachlorophenol	5.0	U

[1]Cannot be separated from Diphenylamine

6W05

1K - FORM I SV-TIC
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.: B3RR8

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02956

Sample wt/vol: 1000 (g/mL) mL Lab File ID: RNP08C56

Level: (LOW/MED) LOW Extraction: (Type) CONT

% Moisture: Decanted: (Y/N) Date Received: 06/21/2006

Concentrated Extract Volume: 1000 (uL) Date Extracted: 06/21/2006

Injection Volume: 1.0 (uL) GPC Factor: Date Analyzed: 06/23/2006

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CONCENTRATION UNITS: (ug/L or ug/kg) ug/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01	100013-00-0	Guanidine, monothiocyanate	4.54	6.4	JN
02	85-44-9	Phthalic anhydride	18.91	29	JN
03	85-44-9	Phthalic anhydride	24.29	38	JN
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
	E966796[2]	Total Alkanes	N/A		

[2]EPA-designated Registry Number.

60

6w06

1D - FORM I SV-1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR9

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02957

Sample wt/vol: 1000 (g/mL) mL Lab File ID: RNP09C57

Level: (LOW/MED) LOW Extraction: (Type) CONT

% Moisture: Decanted: (Y/N) Date Received: 06/21/2006

Concentrated Extract Volume: 1000 (uL) Date Extracted: 06/21/2006

Injection Volume: 1.0 (uL) GPC Factor: Date Analyzed: 06/23/2006

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
100-52-7	Benzaldehyde	5.0	U
108-95-2	Phenol	5.0	U
111-44-4	Bis(2-chloroethyl)ether	5.0	U
95-57-8	2-Chlorophenol	5.0	U
95-48-7	2-Methylphenol	5.0	U
108-60-1	2,2'-Oxybis(1-chloropropane)	5.0	U
98-86-2	Acetophenone	5.0	U
106-44-5	4-Methylphenol	5.0	U
621-64-7	N-Nitroso-di-n-propylamine	5.0	U
67-72-1	Hexachloroethane	5.0	U
98-95-3	Nitrobenzene	5.0	U
78-59-1	Isophorone	5.0	U
88-75-5	2-Nitrophenol	5.0	U
105-67-9	2,4-Dimethylphenol	5.0	U
111-91-1	Bis(2-chloroethoxy)methane	5.0	U
120-83-2	2,4-Dichlorophenol	5.0	U
91-20-3	Naphthalene	5.0	U
106-47-8	4-Chloroaniline	5.0	U
87-68-3	Hexachlorobutadiene	5.0	U
105-60-2	Caprolactam	5.0	U
59-50-7	4-Chloro-3-methylphenol	5.0	U
91-57-6	2-Methylnaphthalene	5.0	U
77-47-4	Hexachlorocyclopentadiene	5.0	U
88-06-2	2,4,6-Trichlorophenol	5.0	U
95-95-4	2,4,5-Trichlorophenol	5.0	U
92-52-4	1,1'-Biphenyl	5.0	U
91-58-7	2-Chloronaphthalene	5.0	U
88-74-4	2-Nitroaniline	10	U
131-11-3	Dimethylphthalate	5.0	U
606-20-2	2,6-Dinitrotoluene	5.0	U
208-96-8	Acenaphthylene	5.0	U
99-09-2	3-Nitroaniline	10	U
83-32-9	Acenaphthene	5.0	U

61

6406

1E - FORM I SV-2
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR9

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02957

Sample wt/vol: 1000 (g/mL) mL Lab File ID: RNP09C57

Level: (LOW/MED) LOW Extraction: (Type) CONT

% Moisture: Decanted: (Y/N) Date Received: 06/21/2006

Concentrated Extract Volume: 1000 (uL) Date Extracted: 06/21/2006

Injection Volume: 1.0 (uL) GPC Factor: Date Analyzed: 06/23/2006

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
51-28-5	2,4-Dinitrophenol	10	U
100-02-7	4-Nitrophenol	10	U
132-64-9	Dibenzofuran	5.0	U
121-14-2	2,4-Dinitrotoluene	5.0	U
84-66-2	Diethylphthalate	5.0	U
86-73-7	Fluorene	5.0	U
7005-72-3	4-Chlorophenyl-phenylether	5.0	U
100-01-6	4-Nitroaniline	10	U
534-52-1	4,6-Dinitro-2-methylphenol	10	U
86-30-6	N-Nitrosodiphenylamine[1]	5.0	U
95-94-3	1,2,4,5-Tetrachlorobenzene	5.0	U
101-55-3	4-Bromophenyl-phenylether	5.0	U
118-74-1	Hexachlorobenzene	5.0	U
1912-24-9	Atrazine	5.0	U
87-86-5	Pentachlorophenol	10	U
85-01-8	Phenanthrene	5.0	U
120-12-7	Anthracene	5.0	U
86-74-8	Carbazole	5.0	U
84-74-2	Di-n-butylphthalate	5.0 ~~0.22~~	~~JB~~ U
206-44-0	Fluoranthene	5.0	U
129-00-0	Pyrene	5.0	U J
85-68-7	Butylbenzylphthalate	5.0 ~~0.40~~	~~JB~~ U
91-94-1	3,3'-Dichlorobenzidine	5.0	U
56-55-3	Benzo(a)anthracene	5.0	U
218-01-9	Chrysene	5.0	U
117-81-7	Bis(2-ethylhexyl)phthalate	5.0 ~~2.8~~	~~JB~~ U
117-84-0	Di-n-octylphthalate	5.0	U
205-99-2	Benzo(b)fluoranthene	5.0	U
207-08-9	Benzo(k)fluoranthene	5.0	U
50-32-8	Benzo(a)pyrene	5.0	U
193-39-5	Indeno(1,2,3-cd)pyrene	5.0	U
53-70-3	Dibenzo(a,h)anthracene	5.0	U
191-24-2	Benzo(g,h,i)perylene	5.0	U
58-90-2	2,3,4,6-Tetrachlorophenol	5.0	U

[1] Cannot be separated from Diphenylamine

62

Gw06

1K - FORM I SV-TIC
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RR9

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: ______ SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02957

Sample wt/vol: 1000 (g/mL) mL Lab File ID: RNP09C57

Level: (LOW/MED) LOW Extraction: (Type) CONT

% Moisture: ______ Decanted: (Y/N) ______ Date Received: 06/21/2006

Concentrated Extract Volume: 1000 (uL) Date Extracted: 06/21/2006

Injection Volume: 1.0 (uL) GPC Factor: ______ Date Analyzed: 06/23/2006

GPC Cleanup: (Y/N) N pH: ______ Dilution Factor: 1.0

CONCENTRATION UNITS: (ug/L or ug/kg) ug/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01	100013-00-0	Guanidine, monothiocyanate	4.55	5.8	JN
02	85-44-9	Phthalic anhydride	18.91	26	JN
03	85-44-9	Phthalic anhydride	24.29	39	JN
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
	E966796[2]	Total Alkanes	N/A		

[2]EPA-designated Registry Number.

63

6w07

1D - FORM I SV-1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RS0

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: ______ SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02958

Sample wt/vol: 1000 (g/mL) mL Lab File ID: RNR05C58

Level: (LOW/MED) LOW Extraction: (Type) CONT

% Moisture: ______ Decanted: (Y/N) ______ Date Received: 06/21/2006

Concentrated Extract Volume: 1000 (uL) Date Extracted: 06/21/2006

Injection Volume: 1.0 (uL) GPC Factor: ______ Date Analyzed: 06/24/2006

GPC Cleanup: (Y/N) N pH: ______ Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
100-52-7	Benzaldehyde	5.0	U
108-95-2	Phenol	5.0	U
111-44-4	Bis(2-chloroethyl)ether	5.0	U
95-57-8	2-Chlorophenol	5.0	U
95-48-7	2-Methylphenol	5.0	U
108-60-1	2,2'-Oxybis(1-chloropropane)	5.0	U
98-86-2	Acetophenone	5.0	U
106-44-5	4-Methylphenol	5.0	U
621-64-7	N-Nitroso-di-n-propylamine	5.0	U
67-72-1	Hexachloroethane	5.0	U
98-95-3	Nitrobenzene	5.0	U
78-59-1	Isophorone	5.0	U
88-75-5	2-Nitrophenol	5.0	U
105-67-9	2,4-Dimethylphenol	5.0	U
111-91-1	Bis(2-chloroethoxy)methane	5.0	U
120-83-2	2,4-Dichlorophenol	5.0	U
91-20-3	Naphthalene	5.0	U
106-47-8	4-Chloroaniline	5.0	U
87-68-3	Hexachlorobutadiene	5.0	U
105-60-2	Caprolactam	5.0	U
59-50-7	4-Chloro-3-methylphenol	5.0	U
91-57-6	2-Methylnaphthalene	5.0	U
77-47-4	Hexachlorocyclopentadiene	5.0	U
88-06-2	2,4,6-Trichlorophenol	5.0	U
95-95-4	2,4,5-Trichlorophenol	5.0	U
92-52-4	1,1'-Biphenyl	5.0	U
91-58-7	2-Chloronaphthalene	5.0	U
88-74-4	2-Nitroaniline	10	UJ
131-11-3	Dimethylphthalate	5.0	U
606-20-2	2,6-Dinitrotoluene	5.0	U
208-96-8	Acenaphthylene	5.0	U
99-09-2	3-Nitroaniline	10	UJ
83-32-9	Acenaphthene	5.0	U

64

6w07

1E - FORM I SV-2
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RS0

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02958

Sample wt/vol: 1000 (g/mL) mL Lab File ID: RNR05C58

Level: (LOW/MED) LOW Extraction: (Type) CONT

% Moisture: Decanted: (Y/N) Date Received: 06/21/2006

Concentrated Extract Volume: 1000 (uL) Date Extracted: 06/21/2006

Injection Volume: 1.0 (uL) GPC Factor: Date Analyzed: 06/24/2006

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
51-28-5	2,4-Dinitrophenol	10	U J
100-02-7	4-Nitrophenol	10	U J
132-64-9	Dibenzofuran	5.0	U
121-14-2	2,4-Dinitrotoluene	5.0	U
84-66-2	Diethylphthalate	5.0	U
86-73-7	Fluorene	5.0	U
7005-72-3	4-Chlorophenyl-phenylether	5.0	U
100-01-6	4-Nitroaniline	10	U J
534-52-1	4,6-Dinitro-2-methylphenol	10	U
86-30-6	N-Nitrosodiphenylamine[1]	5.0	U
95-94-3	1,2,4,5-Tetrachlorobenzene	5.0	U
101-55-3	4-Bromophenyl-phenylether	5.0	U
118-74-1	Hexachlorobenzene	5.0	U
1912-24-9	Atrazine	5.0	U
87-86-5	Pentachlorophenol	10	U
85-01-8	Phenanthrene	5.0	U
120-12-7	Anthracene	5.0	U
86-74-8	Carbazole	5.0	U
84-74-2	Di-n-butylphthalate	5.0 ~~0.23~~	~~JB~~ U
206-44-0	Fluoranthene	5.0	U
129-00-0	Pyrene	5.0	U
85-68-7	Butylbenzylphthalate	5.0 ~~0.49~~	~~JB~~ U
91-94-1	3,3'-Dichlorobenzidine	5.0	U
56-55-3	Benzo(a)anthracene	5.0	U
218-01-9	Chrysene	5.0	U
117-81-7	Bis(2-ethylhexyl)phthalate	5.0 ~~2.0~~	~~JB~~ U
117-84-0	Di-n-octylphthalate	5.0	U
205-99-2	Benzo(b)fluoranthene	5.0	U
207-08-9	Benzo(k)fluoranthene	5.0	U
50-32-8	Benzo(a)pyrene	5.0	U
193-39-5	Indeno(1,2,3-cd)pyrene	5.0	U
53-70-3	Dibenzo(a,h)anthracene	5.0	U
191-24-2	Benzo(g,h,i)perylene	5.0	U
58-90-2	2,3,4,6-Tetrachlorophenol	5.0	U

[1]Cannot be separated from Diphenylamine

65

6w07

1K - FORM I SV-TIC
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RS0

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: ____ SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02958

Sample wt/vol: 1000 (g/mL) mL Lab File ID: RNR05C58

Level: (LOW/MED) LOW Extraction: (Type) CONT

% Moisture: ____ Decanted: (Y/N) ____ Date Received: 06/21/2006

Concentrated Extract Volume: 1000 (uL) Date Extracted: 06/21/2006

Injection Volume: 1.0 (uL) GPC Factor: ____ Date Analyzed: 06/24/2006

GPC Cleanup: (Y/N) N pH: ____ Dilution Factor: 1.0

CONCENTRATION UNITS: (ug/L or ug/kg) ug/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01		Unknown alcohol	4.55	3.7	J
02		Polycyclic hydrocarbon	18.92	25	J
03		Polycyclic hydrocarbon	24.31	38	J
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
	E966796[2]	Total Alkanes	N/A		

[2] EPA-designated Registry Number.

66

ATTACHMENT 1
SOM01.1/Aroclors
SOP NO. HW-33D

Functional Guidelines for Evaluating Organic Analysis

CASE No.: 35465
LABORATORY: DATAC
SAMPLER: W-SAT

SDG No.: B3RR4
SITE: SAN GERMAN
ANALYSIS: PCB

DATA ASSESSMENT

The current SOP HW-33D (Revision 0) April 2006, USEPA Region II Data Validation SOP for Statement of Work SOM01.1 for evaluating organic data have been applied.

All data are valid and acceptable except those analytes rejected "R"(unusable). Due to the detection of QC problems, some analytes may have the "J" (estimated), "N"(presumptive evidence for the presence of the material, "U" (non-detect) or "JN" (presumptive evidence for the presence of the material at an estimated value) flag. All action is detailed on the attached sheets.

The "R" flag means that the associated value is unusable. In other words, significant data bias is evident and the reported analyte concentration is unreliable.

Reviewer's Signature: Habteab Ghebreyesus

Date: July 11, 2006

Verified By:

Date: 7/12/2006

SDG#B3RR4

1. HOLDING TIME:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded.
The following action was taken in the samples and analytes shown due to excessive holding time.

No problems found for this qualification.

2. SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate concentrations were outside contract specifications, qualifications were applied to the samples and analytes as shown below.

No problems found for this qualification.

3. MATRIX SPIKE/SPIKE DUPLICATE, MS/MSD:

The MS/MSD data are generated to determine the long-term precision and accuracy of the analytical method in various matrices. The MS/MSD may be used in conjunction with other QC criteria for additional qualification of data.

No qualifications based on MS/MSD.

4. Laboratory Control Recovery:(LCS)

The LCS data is generated to determine the long term precision and accuracy of the analytical method. The LCS may be used in conjunction with other QC criteria for additional qualification of data.

No problems found for this qualification.

5. BLANK CONTAMINATION:

Quality assurance (QA) blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field and rinse blanks measure cross-contamination of samples during field operations. Depending on the concentration of the analyte in the blank, the analytes are qualified as non-detects, "U".
The following analytes in the sample shown were qualified with "U" for these reasons:

A) Method blank contamination:

No problems found for this qualification.

B) Field or rinse blank contamination:

No problems found for this qualification.

6. CALIBRATION:

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration checks document that the instrument is giving satisfactory daily performance.

A) Percent Relative Standard Deviation (%RSD) and Percent Difference (%D):

For the PCB fraction, if %RSD exceeds 20% for all analytes and the two surrogates, qualify all associated positive results "J" and non-detects "UJ".
For opening CCV, or closing CCV that is used as an opening CCV for the next 12-hour period, if %D exceeds 15% for all analytes and the two surrogates, qualify all associated positive results "J" and non-detects "UJ".
For closing CCV, if %D exceeds 50% for all analytes and the two surrogates, qualify all associated positive results "J" and non-detects "UJ".

No problems found for this qualification.

7. COMPOUND IDENTIFICATION:

A) PCB Fraction:

The retention times of reported compounds must fall within the calculated retention time windows for the two chromatographic columns and a GC/MS confirmation is required if the concentration exceeds 10ng/ml in the final sample extract.

No problems found for this qualification.

8. CONTRACT PROBLEMS NON-COMPLIANCE:

9. FIELD DOCUMENTATION:

10. OTHER PROBLEMS

11. This package contains reextractions, reanalyses or dilutions. Upon reviewing the QA results, the following Form 1(s) are identified NOT to be used.

1H - FORM I ARO

AROCLOR ORGANICS ANALYSIS DATA SHEET

GWD1

EPA SAMPLE NO.

B3RR4

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02951

Sample wt/vol: 1000 (g/mL) mL Lab File ID: 20060624A020,20060624B020

% Moisture: Decanted: (Y/N) Date Received: 06/21/2006

Extraction: (Type) SEPF Date Extracted: 06/21/2006

Concentrated Extract Volume: 10000 (uL) Date Analyzed: 06/25/2006

Injection Volume: 2.0 (uL) GPC Factor: Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: Sulfur Cleanup: (Y/N) N

Acid Cleanup: (Y/N) Y

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	1.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U
37324-23-5	Aroclor-1262	1.0	U
11100-14-4	Aroclor-1268	1.0	U

70

6w02

1H - FORM I ARO
AROCLOR ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR5

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02953

Sample wt/vol: 1000 (g/mL) mL Lab File ID: 20060624A023,20060624B023

% Moisture: Decanted: (Y/N) Date Received: 06/21/2006

Extraction: (Type) SEPF Date Extracted: 06/21/2006

Concentrated Extract Volume: 10000 (uL) Date Analyzed: 06/25/2006

Injection Volume: 2.0 (uL) GPC Factor: Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: Sulfur Cleanup: (Y/N) N

Acid Cleanup: (Y/N) Y

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	1.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U
37324-23-5	Aroclor-1262	1.0	U
11100-14-4	Aroclor-1268	1.0	U

71

6w03

1H - FORM I ARO
AROCLOR ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR6

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: ______ SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02954

Sample wt/vol: 1000 (g/mL) mL Lab File ID: 20060624A024,20060624B024

% Moisture: ______ Decanted: (Y/N) ______ Date Received: 06/21/2006

Extraction: (Type) SEPF Date Extracted: 06/21/2006

Concentrated Extract Volume: 10000 (uL) Date Analyzed: 06/25/2006

Injection Volume: 2.0 (uL) GPC Factor: ______ Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: ______ Sulfur Cleanup: (Y/N) N

Acid Cleanup: (Y/N) Y

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	1.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U
37324-23-5	Aroclor-1262	1.0	U
11100-14-4	Aroclor-1268	1.0	U

72

6w04

1H - FORM I ARO
AROCLOR ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR7

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02955

Sample wt/vol: 1000 (g/mL) mL Lab File ID: 20060624A025,20060624B025

% Moisture: Decanted: (Y/N) Date Received: 06/21/2006

Extraction: (Type) SEPF Date Extracted: 06/21/2006

Concentrated Extract Volume: 10000 (uL) Date Analyzed: 06/25/2006

Injection Volume: 2.0 (uL) GPC Factor: Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: Sulfur Cleanup: (Y/N) N

Acid Cleanup: (Y/N) Y

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	1.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U
37324-23-5	Aroclor-1262	1.0	U
11100-14-4	Aroclor-1268	1.0	U

73

1H - FORM I ARO

AROCLOR ORGANICS ANALYSIS DATA SHEET

6005

EPA SAMPLE NO.

B3RR8

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02956

Sample wt/vol: 1000 (g/mL) mL Lab File ID: 20060624A026,20060624B026

% Moisture: Decanted: (Y/N) Date Received: 06/21/2006

Extraction: (Type) SEPF Date Extracted: 06/21/2006

Concentrated Extract Volume: 10000 (uL) Date Analyzed: 06/25/2006

Injection Volume: 2.0 (uL) GPC Factor: Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: Sulfur Cleanup: (Y/N) N

Acid Cleanup: (Y/N) Y

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	1.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U
37324-23-5	Aroclor-1262	1.0	U
11100-14-4	Aroclor-1268	1.0	U

74

1H - FORM I ARO

AROCLOR ORGANICS ANALYSIS DATA SHEET

Gwob

EPA SAMPLE NO.

B3RR9

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: ______ SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02957

Sample wt/vol: 1000 (g/mL) mL Lab File ID: 20060624A027,20060624B027

% Moisture: ______ Decanted: (Y/N) ______ Date Received: 06/21/2006

Extraction: (Type) SEPF Date Extracted: 06/21/2006

Concentrated Extract Volume: 10000 (uL) Date Analyzed: 06/25/2006

Injection Volume: 2.0 (uL) GPC Factor: ______ Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: ______ Sulfur Cleanup: (Y/N) N

Acid Cleanup: (Y/N) Y

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	1.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U
37324-23-5	Aroclor-1262	1.0	U
11100-14-4	Aroclor-1268	1.0	U

75

1H - FORM I ARO

AROCLOR ORGANICS ANALYSIS DATA SHEET

6w07

EPA SAMPLE NO.

B3RS0

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02958

Sample wt/vol: 1000 (g/mL) mL Lab File ID: 20060624A028,20060624B028

% Moisture: Decanted: (Y/N) Date Received: 06/21/2006

Extraction: (Type) SEPF Date Extracted: 06/21/2006

Concentrated Extract Volume: 10000 (uL) Date Analyzed: 06/25/2006

Injection Volume: 2.0 (uL) GPC Factor: Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: Sulfur Cleanup: (Y/N) N

Acid Cleanup: (Y/N) Y

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	1.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U
37324-23-5	Aroclor-1262	1.0	U
11100-14-4	Aroclor-1268	1.0	U

Functional Guidelines for Evaluating Organic Analysis

CASE No.: 35465
LABORATORY: DATAC
SAMPLER: W-SAT

SDG No.: B3RR4
SITE: SAN GERMAN
ANALYSIS: PESTICIDE

DATA ASSESSMENT

The current SOP HW-33C (Revision 0) March 2006, USEPA Region II Data Validation SOP for Statement of Work SOM01.1 for evaluating organic data have been applied.

All data are valid and acceptable except those analytes rejected "R"(unusable). Due to the detection of QC problems, some analytes may have the "J" (estimated), "N"(presumptive evidence for the presence of the material, "U" (non-detect) or "JN" (presumptive evidence for the presence of the material at an estimated value) flag. All action is detailed on the attached sheets.

The "R" flag means that the associated value is unusable. In other words, significant data bias is evident and the reported analyte concentration is unreliable.

Reviewer's Signature: Habteab Ghebreyesus **Date:** July 11, 2006

Verified By: [signature] **Date:** 7/12/2006

SDG#B3RR4

1. HOLDING TIME:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded.
The following action was taken in the samples and analytes shown due to excessive holding time.

No problems found for this qualification.

2. SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate concentrations were outside contract specifications, qualifications were applied to the samples and analytes as shown below.

No problems found for this qualification.

3. MATRIX SPIKE/SPIKE DUPLICATE, MS/MSD:

The MS/MSD data are generated to determine the long-term precision and accuracy of the analytical method in various matrices. The MS/MSD may be used in conjunction with other QC criteria for additional qualification of data.

The following Pesticide water samples have spike percent recoveries greater than the upper acceptance limit. Detected spike compounds are qualified "J" and non-detects are not qualified.

B3RR4MSD, Aldrin

4. Laboratory Control Recovery:(LCS)

The LCS data is generated to determine the long term precision and accuracy of the analytical method. The LCS may be used in conjunction with other QC criteria for additional qualification of data.

No problems found for this qualification.

5. BLANK CONTAMINATION:

Quality assurance (QA) blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field and rinse blanks measure cross-contamination of samples during field operations. Depending on the concentration of the analyte in the

blank, the analytes are qualified as non-detects, "U".
The following analytes in the sample shown were qualified with "U" for these reasons:

A) . Method blank contamination:

No problems found for this qualification

B) Field or rinse blank contamination:

No field blank for this SDG.

6. CALIBRATION:

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration checks document that the instrument is giving satisfactory daily performance.

A) Percent Relative Standard Deviation (%RSD) and Percent Difference (%D):

For the PESTICIDE fraction, if %RSD exceeds 20% for all analytes except alpha-BHC and delta-BHC 25%, for the two surrogates and Toxaphene 30%, qualify all associated positive results "J" and non-detects are not qualified.

The Percent Difference (%D) for each of the SCP and surrogate in the PEM used for CCV must be greater than or equal to-25% and less than or equal to 25.0%. The Percent Difference not within limits, detected associated compounds ore qualified "J" and non-detected associated compounds are qualified "UJ".

The following analytes in the sample shown were qualified for %RSD and %D:

No problems found for this qualification.

7. COMPOUND IDENTIFICATION:

A) PESTICIDE Fraction:

The retention times of reported compounds must fall within the calculated retention time windows for the two chromatographic columns and a GC/MS confirmation is required if the concentration exceeds 10ng/ml in the final sample extract.

DC-x The following pesticide samples have analytes for which the percent difference between column results exceeds primary criteria. Hits > CRQL are flagged "J". Or: if %D is > 50% an value is < CRQL, sample result is elevated to the CRQL and qualified "U". When the percent difference between column results exceeds expanded criteria, and hits >CRQL are flagged "JN" or "R.

Dieldrin-U, Endrin-U, Endosulfan II-U
B3RR4

Endrin ketone-J
B3RR4MS

4,4'-DDD-J, Endrin ketone-J
B3RR4MSD

4,4-DDT-U, Methoxychlor-U
B3RR8

Gamma-BHC-J, Heptachlor-U, Endrin ketone-J, Endrin aldehyde-J
PLCSW1

8. CONTRACT PROBLEMS NON-COMPLIANCE:

9. FIELD DOCUMENTATION:

10. OTHER PROBLEMS

11. This package contains reextractions, reanalyses or dilutions. Upon reviewing the QA results, the following Form 1(s) are identified NOT to be used.

6w01

1G - FORM I PEST
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR4

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: ______ SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02951

Sample wt/vol: 1000 (g/mL) mL Lab File ID: 21060623A010,21060623B010

% Moisture: ______ Decanted: (Y/N) ______ Date Received: 06/21/2006

Extraction: (Type) SEPF Date Extracted: 06/21/2006

Concentrated Extract Volume: 10000 (uL) Date Analyzed: 06/23/2006

Injection Volume: 2.0 (uL) GPC Factor: ______ Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: ______ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10 ~~0.0026~~	~~JP~~ U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10 ~~0.0020~~	~~JP~~ U
33213-65-9	Endosulfan II	0.10 ~~0.0016~~	~~JP~~ U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U

81

6w02

1G - FORM I PEST
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR5

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: ______ SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02953

Sample wt/vol: 1000 (g/mL) mL Lab File ID: 21060623A013,21060623B013

% Moisture: ______ Decanted: (Y/N) ______ Date Received: 06/21/2006

Extraction: (Type) SEPF Date Extracted: 06/21/2006

Concentrated Extract Volume: 10000 (uL) Date Analyzed: 06/23/2006

Injection Volume: 2.0 (uL) GPC Factor: ______ Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: ______ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U

82

1G - FORM I PEST

PESTICIDE ORGANICS ANALYSIS DATA SHEET

6w03

EPA SAMPLE NO.

B3RR6

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02954

Sample wt/vol: 1000 (g/mL) mL Lab File ID: 21060623A014,21060623B014

% Moisture: Decanted: (Y/N) Date Received: 06/21/2006

Extraction: (Type) SEPF Date Extracted: 06/21/2006

Concentrated Extract Volume: 10000 (uL) Date Analyzed: 06/23/2006

Injection Volume: 2.0 (uL) GPC Factor: Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U

83

1G - FORM I PEST
PESTICIDE ORGANICS ANALYSIS DATA SHEET

6w04

EPA SAMPLE NO.

B3RR7

Lab Name: DataChem Laboratories, Inc.   Contract: EP-W-05-026

Lab Code: DATAC   Case No.: 35465   Mod. Ref No.: ______   SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER   Lab Sample ID: 06C02955

Sample wt/vol: 1000 (g/mL) mL   Lab File ID: 21060623A015,21060623B015

% Moisture: ______   Decanted: (Y/N) ______   Date Received: 06/21/2006

Extraction: (Type) SEPF   Date Extracted: 06/21/2006

Concentrated Extract Volume: 10000 (uL)   Date Analyzed: 06/24/2006

Injection Volume: 2.0 (uL)   GPC Factor: ______   Dilution Factor: 1.0

GPC Cleanup: (Y/N) N   pH: ______   Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U

84

6w05

1G - FORM I PEST
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR8

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: ______ SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02956

Sample wt/vol: 1000 (g/mL) mL Lab File ID: 21060623A016,21060623B016

% Moisture: ______ Decanted: (Y/N) ______ Date Received: 06/21/2006

Extraction: (Type) SEPF Date Extracted: 06/21/2006

Concentrated Extract Volume: 10000 (uL) Date Analyzed: 06/24/2006

Injection Volume: 2.0 (uL) GPC Factor: ______ Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: ______ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10 ~~0.00090~~	~~JP~~ U
72-43-5	Methoxychlor	0.50 ~~0.0042~~	~~JP~~ U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U

1G - FORM I PEST

PESTICIDE ORGANICS ANALYSIS DATA SHEET

6w0b

EPA SAMPLE NO.

B3RR9

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: ______ SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02957

Sample wt/vol: 1000 (g/mL) mL Lab File ID: 21060623A017,21060623B017

% Moisture: ______ Decanted: (Y/N) ______ Date Received: 06/21/2006

Extraction: (Type) SEPF Date Extracted: 06/21/2006

Concentrated Extract Volume: 10000 (uL) Date Analyzed: 06/24/2006

Injection Volume: 2.0 (uL) GPC Factor: ______ Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: ______ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U

86

6w07

1G - FORM I PEST
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RS0

Lab Name: DataChem Laboratories, Inc. Contract: EP-W-05-026

Lab Code: DATAC Case No.: 35465 Mod. Ref No.: ________ SDG No.: B3RR4

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 06C02958

Sample wt/vol: 1000 (g/mL) mL Lab File ID: 21060623A018,21060623B018

% Moisture: ________ Decanted: (Y/N) ________ Date Received: 06/21/2006

Extraction: (Type) SEPF Date Extracted: 06/21/2006

Concentrated Extract Volume: 10000 (uL) Date Analyzed: 06/24/2006

Injection Volume: 2.0 (uL) GPC Factor: ________ Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: ________ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U

YES NO N/A

. . . .

PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 35465 LAB: DATAC

SITE NAME: San German SDG No(s).: B3RR4

1.0 Chain of Custody and Sampling Trip Reports

1.1 Are the Traffic Reports/Chain-of-Custody Records present for all samples? [/] ___ ___

ACTION: If no, contact RSCC, or the TOPO to obtain replacement of missing or illegible copies from the lab.

1.2 Is the Sampling Trip Report present for all samples? [/] ___ ___

ACTION: If no, contact either RSCC or ask the TOPO to obtain the necessary information from the prime contractor.

2.0 Data Completeness and Deliverables

2.1 Have any missing deliverables been received and added to the data package? ___ [/] ___

ACTION: Contact the TOPO to obtain an explanation or resubmittal of any missing deliverables from the lab. If lab cannot provide them, note the effect on the review of the data package in the Contract Problems/Non-compliance section of the Data Assessment.

2.2 Was CLASS CCS checklist included with the package? [/] ___ ___

YES NO N/A

. . . .

2.3 Are there any discrepancies between the Traffic Reports/Chain-of-Custody Records, Sampling Trip Report and Sample Tags? ___ [✓] ___

ACTION: If yes, contact the TOPO to obtain an explanation or resubmittal of any missing deliverables from the laboratory.

3.0 Cover Letter SDG Narrative

3.1 Is the SDG Narrative or Cover Letter Present? [✓] ___ ___

3.2 Are case number, SDG number and contract number contained in the SDG Narrative or cover letter (see SOW, Exhibit B, section 2.5.1)?
EPA sample numbers in the SDG, detailed documentation of any quality control, sample, shipment, and/or analytical problems encountered in processing the samples? Corrective action taken? [✓] ___ ___

3.3 Does the Narrative contain description of column and trap used(see SOM, page B-12, section 2.5.1)?

3.4 Does the narrative, VOA section, contain a list of all TICs identified as alkanes and their estimated concentrations? [✓] ___ ___

3.5 Did the contractor record the temperature of the cooler on the Form DC-1, Item 9 - Cooler Temperature, and in the SDG Narrative? [✓] ___ ___

3.6 Does the narrative contain a list of the pH values determined for each water sample submitted for volatiles analysis (SOW, page B-13, section 2.5.1.2)? [✓] ___ ___

3.7 Does the Case Narrative contain the "verbatim" statement (page B-12, section 2.5.1 of the SOM)? [✓] ___ ___

YES NO N/A

. . . .

ACTION: If "No", to any question in this section, contact the TOPO to obtain necessary resubmittals. If unavailable, document under the Contract Problems/ Non-Compliance section of the Data Assessment.

4.0 Data Validation Checklist

4.1 Check the package for the following (see SOM reporting requirements, section 2.1, page B-10):

	YES	NO	N/A
a. Is the package paginated in ascending order starting from the SDG narrative?	[✓]	___	___
b. Are all forms and copies legible?	[✓]	___	___
c. Assembled in the order set forth in the SOW?	[✓]	___	___
Trace Concentration Volatiles Data present?	[✓]	___	

PART A: Trace VOA ANALYSES

1.0 Sample Conditions/Problems

	YES	NO	N/A
1.1 Do the Traffic Reports/Chain-of-Custody Records, Sampling Trip Report or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data?	___	[✓]	___

ACTION: If samples were not iced or the ice was melted upon arrival at the laboratory and the temperature of the cooler was > 10° C, then flag all positive results with a "J" and all non-detects "UJ".

YES NO N/A

ACTION: If both VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

2.0 Holding Times

2.1 Have any VOA technical holding times, determined from date of collection to date of analysis, been exceeded? ___ [ ] ___

Technical Holding Times: The technical holding time criterion for water samples is 14 days from sample collection provided that samples are acid-preserved to pH 2 or below, and that they are cooled at $4°C \pm 2°C$. Review the SDG Narrative to determine if samples were preserved and arrived at the laboratory in proper condition. If there is no indication in the SDG Narrative, the TR/COC, or the sample records that there was a problem with the samples, the integrity of samples can be assumed to be acceptable. For aqueous samples that were properly cooled, but which have no indication of being preserved, the maximum holding time is 7 days from sample collection.

ACTION: List sampling, VTSR, analysis dates and preservation for samples which missed holding time in the table below.

Table of Holding Time Violations
(See Chain-of-Custody Records)

Sample ID	Was Sample Preserved?	Date Sampled	Date Lab Received	Date Analyzed

YES NO N/A

. . . .

ACTION: Qualify sample results using preservation and technical holding time information as follows:

a. If there is no evidence that the samples were properly preserved (acid and ice), but were analyzed within the technical holding time (7 days from sample collection), no qualification of the data is required.

b. If there is no evidence that the samples were properly preserved (acid and ice), and the samples were analyzed outside of the technical holding time (7 days from sample collection), qualify detects for <u>all volatile compounds</u> "J" and non-detects "R".

c. If the samples were properly preserved (acid and ice), and the samples were analyzed within the technical holding time (14 days from sample collection), no qualification of the data is required.

d. If the samples were properly preserved(acid and ice), but were analyzed outside of the technical holding time (14 days from sample collection), qualify detects "J" and non-detects "R".

3.0 Deuterated Monitoring Compound (DMC) Recovery (Form II)

3.1 Are the Volatile SMC Recovery Summaries (Form II present? [✓] ___ ___

ACTION: Contact the TOPO to obtain an explanation/resubmittal from the lab. If missing deliverables are unavailable, document the effect in the Data Assessment.

3.2 Were outliers marked correctly with an asterisk? [✓] ___ ___

ACTION: Circle all outliers in red.

3.3 Were more than three of the fourteen (14) Deuterated Monitoring Compounds (DMC's) recoveries outside their corresponding limits? ___ [✓] ___

	YES	NO	N/A
. . . .			
If yes, were samples re-analyzed?	[ ]	___	✓
Were method blanks re-analyzed?	[ ]	___	✓

ACTION: If any DMC is outside the required limits (see Table below), qualify their associated target compounds (See Table below) as follows:

VOLATILE DMC AND THEIR ASSOCIATED TARGET COMPOUNDS

Chloroethane-d5 Dichlorodifluoromethane Chloromethane Bromomethane Chloroethane Carbon Disulfide	1,2-Dichloropropane-d6 Cyclohexane Methylcyclohexane 1,2-Dichloropropane Bromodichloromethane	1,2-Dichlorobenzene-d4 Chlorobenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene 1,2,3-Trichlorobenzene
1,4-Dioxane-d8 1,4-Dioxane	trans-1,3-Dichloropropene-d4 cis-1,3-Dichloropropene trans-1,3-Dichloropropene 1,1,2-Trichloroethane	Chloroform-d 1,1-Dichloroethane Bromochloromethane Chloroform Dibromochloromethane Bromoform
2-Butanone-d5 Acetone 2-butanone	1,1-dichloroethene-d2 trans-1,2-Dichloroethene cis-1,2-Dichloroethene	2-Hexanone-d5 4-Methyl-2-pentanone 2-Hexanone

YES NO N/A

<u>Vinyl Chloride-d3</u> Vinyl Chloride	<u>Benzene-d6</u> Benzene	<u>1,1,2,2-Tetrachloroethane-d2</u> 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane
<u>1,2-Dichloroethane-d4</u> Trichlorofluoromethane 1,1-Dichloroethene 1,1,2-Trichloro-1,2,2-trifluoroethane Methyl Acetate Methylene Chloride Methyl tert-Butyl Ether Carbon Tetrachloride 1,2-Dichloroethane 1,1,1-Trichloroethane 1,2-Dibromoethane	<u>Toluene-d8</u> Trichloroethene Toluene Tetrachloroethene Ethylbenzene o-Xylenes m,p-Xylene Styrene Isopropylbenzene	

<u>VOLATILE DEUTERATED MONITORING COMPOUND RECOVERY LIMITS</u>

DMC	%RECOVERY LIMITS	DMC	%RECOVERY LIMITS
Vinyl Chloride-d3	65-131	1,2-Dichloropropane-d6	79-124
Chloroethane-d5	71-131	Toluene-d8	77-121
DMC	%RECOVERY LIMITS	DMC	%RECOVERY LIMITS
1,1-Dichloroethene-d2	55-104	trans-1,3-Dichloropropane-d4	73-121

YES NO N/A

. . . .

2-Butanone-d5	49-155	2-Hexanone-d5	28-135
Chloroform-d	78-121	1,4-Dioxane	50-150
1,2-Dichloroethane-d4	78-129	1,1,2,2-Tetrachloroethane-d2	73-125
Benzene-d6	77-124	1,2-Dichlorobenzene-d4	80-131

1. For any recovery greater than the upper limit:

   a. Qualify "J" all positive associated target compounds.
   b. Do not qualify associated non-detects.

2. For any recovery greater than or equal to 20%, but less than the lower limit:

   a. Qualify "J" all positive associated target compounds.
   b. Qualify "UJ" associated non-detects.

3. For any recovery less than 20%:

   a. Qualify "J" all positive associated target compounds.
   b. Qualify "R" all associated non-detects.

NOTE: Up to three (3) DMC's per sample, excluding 1,4-Dioxane-d8, and SIM analysis may fail to meet the recovery limits. (SOM, sec. 11.4.4, pg. D-36/Trace VOA). Recovery limits for 1,4-Dioxane-d8 are advisory.
As per SOM, any sample which has more than 3 DMC's outside the limits, it must be reanalyzed (sec. 11.5.3 pg. D-37/Trace VOA).

ACTION: Note in the Data Assessment under Contract Problems / Non-Compliance if the Lab did not perform reanalysis.

3.4 Are there any transcription/calculation errors between raw data and form II? ___ [✓] ___

YES NO N/A

. . . .

ACTION: If large errors exist, ask the TOPO to obtain an explanation/resubmittal from the lab, make any necessary corrections and note errors in the data assessment.

4.0 Matrix Spike/Matrix Spike Duplicate Recovery (Form III)

Note: Data for MS/MSD will not be present unless requested.

4.1 Are the MS/MSD Recovery Forms (Form III Trace VOA) present? [ ] ✓ ___

4.2 Was the MS/MSD analyzed at the required frequency (once per SDG, or every 20 samples, whichever is more frequent)? [ ] ✓ ___

ACTION: If any MS/MSD data are missing, take action as specified in section 3.1 above.

ACTION: No action is taken on MS/MSD data alone. However, using professional judgement, the validator may use the MS and MSD results in conjunction with other QC criteria and determine the need for some qualification of the data.

5.0 Method Blanks (Form IV)

5.1 Is the Volatile Method Blank Summary (Form IV Trace VOA) present? [✓] ___ ___

5.2 Frequency of Analysis: For the analysis of Trace Concentration VOA TCL compounds, has a method blank been analyzed for each SDG or every 20 samples, whichever is more frequent? [✓] ___ ___

5.3 Has a VOA method blank been analyzed after the calibration standards and once every 12 hours time period for each GC/MS instrument used? [✓] ___ ___

5.4 Was a VOA instrument blank analyzed after each sample/dilution that contains a target compound

	YES	NO	N/A
exceeding the initial calibration range (see SOM, page D-39/Trace VOA, section 12.1.1.3)?	[✓]	___	___

ACTION: If any method/instrument blank data are missing, notify the TOPO to obtain resubmittals or an explanation from the lab. If method blank data are unavailable, the reviewer may use professional judgement, or substitute field blank or trip blank data for missing method blank data.

If an instrument blank was not analyzed after a sample containing a target analyte exceeding the initial calibration standards, inspect the sample chromatogram acquired immediately after this sample for possible carryover. The system is considered uncontaminated if the target analyte is below CRQL. Use professional judgement to determine if carryover occurred and qualify analyte(s) accordingly.

	YES	NO	N/A
5.5 Was a storage blank analyzed once per SDG after all the samples were analyzed?	[✓]	___	___

ACTION: If storage blank data is missing, contact the TOPO to obtain any missing deliverables from the laboratory. If unavailable, note in the Contract Problems/Non-Compliance section of the Data Assessment.

5.6 The validator should verify that the correct identification scheme for EPA blanks was used. (See SOM page B-39, section 3.3.7.3 for more information.)

	YES	NO	N/A
Was the correct identification scheme used for all Trace VOA blanks?	[✓]	___	___

ACTION: Contact the TOPO to obtain corrections from the lab, or make the necessary corrections. Document in the "Contract Problems/Non-Compliance section of the Data Assessment all corrections made by the validator.

5.7 <u>Chromatography</u>: review the blank raw data - chromatograms (RICs), quant. reports, data system printouts and spectra.

YES NO N/A

. . . .

Also compare the storage blank raw data with the method blank. Determine if contamination in the storage blank is also present in the method blank.

Is the chromatographic performance (baseline stability) for each instrument acceptable for Trace VOAs? [✓] ___ ___

ACTION: Use professional judgement to determine the effect on the data.

5.8 Are all detected hits for target compounds in method, and storage blanks less than the CRQL? [✓] ___ ___

<u>Exception</u>: Methylene Chloride, Acetone and 2-butanone must be less than 2X times their respective CRQLs.

ACTION: If no, an explanation and laboratory's corrective actions must be addressed in the case narrative. If the narrative contains no explanation, then make a note in the Contract Problems/Non-Compliance section of the Data Assessment.

6.0 <u>Contamination</u>

NOTE: "Water blanks", "drill blanks", and "distilled water blanks" are validated like any other sample, and are <u>not</u> used to qualify data. Do not confuse them with the other QC blanks discussed below.

6.1 Does the storage blank contain positive results (TCL and/or TICs) for Trace Concentration VOAs? ___ [✓] ___

6.2 Do any method/reagent/instrument blanks contain positive results (including TICs) for Low Concentration VOAs? ✓ [ ] ___

NOTE: Contaminated instrument blanks are unacceptable under this SOW (see page D-41/Trace VOA, section 12.1.6.3).

YES NO N/A

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance if a contaminated instrument blank was submitted.

ACTION: Sample analysis results after the high concentration sample must be evaluated for carryover. Sample must meet the maximum carryover criteria as listed in SOM sec. 11.4.8.1, p. D-37/VOA. ("the sample must not contain a concentration above the CRQL for the target compounds that exceeded the limit in the contaminated sample.")

6.3 Do any field/trip/rinse blanks have positive Low Concentration VOA results (including TICs)? ✓ [ ] ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated with a particular group of samples (may exceed one per case) must be used to qualify data. Trip blanks are used to qualify only those samples with which they were shipped. Blanks may not be qualified because of contamination in another blank. Field blanks & trip blanks must be qualified for system monitoring compound, instrument performance criteria, spectral or calibration QC problems.

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks. If any blanks are grossly contaminated, all associated sample data should be qualified unusable (R).

YES NO N/A

. . . .

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field, Trip, Storage, Instrument ***	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and <2x the CRQL **	Report concentration of sample with a U
		≥ 2X CRQL **	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL & < 2x blank contamination	Report blank value for sample concentration with a U
		≥ CRQL and ≥ blank contamination	No qualification required
	Gross contamination **	Detects	Qualify results as unusable R
	TIC > 2ug/L	Detects	See "Action" below

* 2x the CRQL for methylene chloride, 2-butanone and acetone

** 10x the CRQL (20x the CRQL for methylene chloride, 2-butanone and acetone)

*** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: Analytes qualified "U" for blank contamination are treated as "hits" when qualifying for calibration criteria.

Note: When applied as described in the table above, the contaminant concentration in the blank are multiplied by the sample dilution factor.

ACTION : For TIC compounds, if the concentration in the sample is less than five times the concentration in the most contaminated associated blank, flag the sample data "R" (unusable).

YES NO N/A

. . . .

6.4 Are there field/rinse/equipment blanks associated with every sample? [✓] ___ ___

ACTION: Note in data assessment that there is no associated field/rinse/equipment blank.

<u>Exception</u>: samples taken from a drinking water tap do not have associated field blanks.

7.0 GC/MS Instrument Performance Check (Form V)

7.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for Bromofluorobenzene (BFB)? [✓] ___ ___

7.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? [✓] ___ ___

7.3 Did the 12-hour clock begin with either the injection of BFB, or in cases where a closing continuing calibration (CCV) was used as an opening CCV? [✓] ___ ___

Listed below are some, but not necessarily all, examples of acceptable analytical sequences incorporating the use of the opening/closing CCV. Use these examples as a guide for possible analytical sequences that can be expected.

Conditions for When Example Sequence is Appropriate:	Acceptable Criteria That Must be Met:	Notes:
If time remains on the 12 hour clock after initial calibration sequence	• BFB tunes meet instrument performance criteria. • The five initial calibration standards meet initial calibration criteria. • CCV A meets both opening and closing CCV criteria • CCV B meets closing CCV criteria.	The requirement of starting the new 12-hr clock for Analytical Sequence 2 with a new BFB tune is waived if CCV A meets opening CCV criteria. If CCV B meets opening CCV criteria, a method blank and subsequent samples may be analyzed immediately after CCV B.

YES NO N/A

If time remains on the 12 hour clock after initial calibration sequence	• BFB tunes meet instrument performance criteria. • The five initial calibration standards meet initial calibration criteria. • CCV A meets closing CCV criteria (but does not meet opening CCV criteria). • CCV B meets opening CCV criteria. • CCV C meets closing CCV Criteria.	CCV A does not meet opening criteria, therefore a new BFB tune must be performed, immediately followed by CCV B before a method blank and any samples may be analyzed. In this case, the new 12 hr clock and Analytical Sequence 2 begins with the injection of the new BFB tune.
If more than 12 hrs have elapsed since the most recent initial calibration or closing CCV. OR If the most recent closing CCV was not or could not be used as an opening CCV.	• BFB tunes meet instrument performance criteria. • CCV A meets opening CCV criteria. • CCV B meets both opening and closing CCV criteria. • CCV C meets both opening and closing CCV criteria.	The requirement of starting the new 12 hour clock for Analytical Sequence 2 with a new BFB tune is waived if CCV B meets opening CCV criteria. If CCV C meets opening CCV criteria, a method blank and subsequent samples may be analyzed immediately after CCV B.
If more than 12 hrs have elapsed since the most recent initial calibration or closing CCV OR If the most recent closing CCV was not or could not be used as an opening CCV	• BFB tunes meet instrument performance criteria. • CCV A meets opening CCV criteria. • CCV B meets closing CCV criteria (but does not meet opening CCV criteria). • CCV C meets opening CCV Criteria. • CCV D meets both opening and closing CCV criteria.	CCV B does not meet opening CCV criteria, therefore a new BFB tune must be performed, immediately followed by CCV B before a method blank and any samples may be analyzed. In this case, the new 12 hr clock and Analytical Sequence 2 begins with the injection of the new BFB tune. The requirement of starting the new 12 hr clock for Analytical Sequence 3 with a new BFB tune is waived if CCV D meets opening CCV criteria. If CCV D meets opening criteria, a method blank and subsequent samples may be analyzed after CCV B.

7.4 Have the ion abundances been normalized to m/z 95 [✓] ___ ___

YES NO N/A

. . . .

NOTE: All ion abundance ratios must be normalized to m/z 95, the nominal base peak, even though the ion abundance of m/z 174 may be up to 120% that of m/z 95.

ACTION: If mass assignment is in error, qualify all associated data as unusable (R).

7.5 Have the ion abundance criteria been met for each instrument used?

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, professional Judgement may be applied to determine to what extent the data may be utilized.

7.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.)

7.7 Is the number of significant figures for the reported relative abundances consistent with the number given in the ion abundance criteria column on Form V ?

ACTION: If large errors exist, take action as specified in section 3.1 above.

7.8 Is the spectrum of the mass calibration compound acceptable?

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

8.0 Target Compound List (TCL) Analytes (Form I)

8.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate?

b. Regional Control/MS/MSD samples?

c. Blanks (method, trip, etc)?

8.2 Are the VOA Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following:

	YES	NO	N/A
a. Samples and/or fractions as appropriate?	[✓]	___	___
b. Regional Control/MS/MSD samples?	[ ]	___	✓
c. Blanks (method, trip, etc)?	[✓]	___	___

ACTION: If any data are missing, take action specified in 3.1 above.

8.3 Is chromatographic performance acceptable with respect to:

	YES	NO	N/A
Baseline stability?	[✓]	___	___
Resolution?	[✓]	___	___
Peak shape?	[✓]	___	___
Full-scale graph (attenuation)?	[✓]	___	___
Other: ________________?	[ ]	___	✓

ACTION: Use professional judgement to determine the acceptability of the data.

	YES	NO	N/A
8.4 Are lab-generated standard mass spectra of the identified VOA compounds present for each sample?	[✓]	___	___

ACTION: If any mass spectra are missing, take action as specified in 3.1 above. If lab does not generate their own standard spectra, make note under the "Contract Problems/Non-Compliance" section of the Data Assessment. If spectra are unavailable reject "R" the reported results.

	YES	NO	N/A
8.5 Is the RRT of each reported compound within ± 0.06 RRT units of the standard RRT in the continuing calibration?	[✓]	___	___
8.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum?	[✓]	___	___
8.7 Do sample and standard relative ion intensities agree to within ± 20%?	[✓]	___	___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R) or changed to non-detected (U) at the calculated detection limit. In order to be

	YES	NO	N/A

positively identified, the data must comply with the criteria listed in sections 8.4-8.7 above.

ACTION: When sample carry-over is suspected, review section 6.2/Action #2 above before determining if instrument cross-contamination has affected positive compound identifications.

9.0 Tentatively Identified Compounds (TIC)

		YES	NO	N/A
9.1	Are all Tentatively Identified Compound Forms (Form I VOA-TIC) present? Do listed TICs include scan number or retention time, as well as the estimated "J" and/or "JN" qualifier?	[✓]	___	___
9.2	Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:			
	a. Samples and/or fractions as appropriate?	[✓]	___	___
	b. Blanks?	[✓]	___	___
	b. Are Alkanes listed in/or part of the Case Narrative?	[✓]	___	___

ACTION: If any TIC data are missing, take action specified in 3.1 above.

ACTION: Verify "JN" qualifier is present for all chemically named TICs having a percent match of greater than or equal 85%. TICs labeled "unknown" are qualified with a "J" qualifier.

		YES	NO	N/A
9.3	Are any target compounds (from any fraction) listed as TICs? (Example: 1,2-dimethylbenzene is xylene - a VOA target analyte - and should not be reported as a TIC.)	___	[✓]	___

ACTION: Flag with "R" only target compound detected in another fraction. (except blank contamination)

		YES	NO	N/A
9.4	Are all ions present in the reference mass spectrum with a relative intensity greater than 10% also present in the sample mass spectrum?	[✓]	___	___
9.5	Do TICs and "best match" reference spectra relative ion intensities agree within ± 20%?	[✓]	___	___

ACTION: Use professional judgement to determine the acceptability of TIC identifications. If it is determined that an incorrect identification was made, change its identification to "unknown" or

YES NO N/A

to some less specific identification (example: "C3 substituted benzene") as appropriate.

Action: When a compound is not found in any blank, but is detected in a sample and is a suspected artifact of a common laboratory contaminant, solvent preservatives or Aldo condensation, the result should be qualified as unusable (R). (i.e., common lab contaminants such as CO_2(m/e 44), Siloxanes (m/e 73), diethyl ether, hexane, certain freons. Aldol condensation products: 4-hydroxy-4-methyl-2-pentanone, 4-methyl-2-penten-2-one and 5,5-dimethyl-2(H)-furanone. Solvent preservatives: cyclohexene, and related by-products: cyclohexanone, cyclohexenone, cyclohexanol, cyclohexenone, chlorocyclohexene, and chlorocyclohexanol.).

10.0 Compound Quantitation and Reported Detection Limits

10.1 Are there any transcription/calculation errors in Form I results? (Check at least two positive values. Verify that the correct internal standards, quantitation ions, and RRFs were used to calculate Form I results.) ___ [✓] ___

10.2 Are the CRQLs adjusted to reflect sample dilutions? [✓] ___ ___

ACTION: If errors are large, take action as specified in section 3.1 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQLs data from the diluted sample). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and its corresponding value on the original Form I and substituting the data from the diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's not to be used, including any in the data summary package.

11.0 Standards Data (GC/MS)

11.1 Are the reconstructed ion chromatograms, and data system printouts (quant. reports) present for each initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.1 above.

12.0 GC/MS Initial Calibration (Form VI)

12.1 Are the Initial Calibration Forms (Form VI LCV) present and complete for the volatile fraction at concentrations

YES NO N/A

. . . .

of 0.5, 1, 5, 10, and 25 µg/ℓ for non-ketones, 5, 10, 50, 100, and 200 ug/L for ketones and 20, 40, 250, 400, and 800 ug/L for 1,4-dioxane. [✓] ___ ___

Note: The initial calibration standards for 1,4-dioxane by Selected Ion Monitoring (SIM) technique are 2, 4, 25, 40 and 80 ug/L.

ACTION: If any Initial Calibration forms are missing, take action as specified in section 3.1 above.

12.2 Are the relative standard deviation (RSD) stable for VOA's over the concentration range of the calibration (i.e., %RSD ≤ 30%, ≤ 40% for poor performers (see table below), ≤ 50% for 1,4-dioxane)? [✓] ___ ___

ACTION: Circle all outliers in red.

NOTE: The twenty two (22) poor performers compounds and associated DMCs are listed below. The relative response factor (RRF) for these compounds must be greater than or equal to 0.010. All DMC must meet RRF ≥ 0.010.

Volatile Compounds Exhibiting Poor Response

Volatile Compounds	
Acetone	1,2-Dibromo-3-chloropropane
2-Butanone	Isopropylbenzene
Carbon disulfide	Methyl acetate
Chloroethane	Methylene chloride
Chloromethane	Methylcyclohexane
Cyclohexane	Methyl tert-butyl ether
1,4-Dioxane	trans-1,2-Dichloroethene
1,2-Dibromoethane	4-Methyl-2-pentanone
Dichlorodifluoromethane	2-Hexanone
cis-1,2-dichloroethene	Trichlorofluoromethane
1,2-Dichloropropane	1,1,2-Trichloro-1,2,2-trifluoroethane

ACTION: If %RSD > 30.0%, (> 40.0% for the poor performers, and > 50% for 1,4-dioxane), qualify associated positive results for that analyte "J" (estimated). If %RSD is > 90, flag all non-detects for that analyte "R" (unusable) and positive hits "J".

YES NO N/A

NOTE: Analytes previously qualified "U" for blank contamination are still treated as "hits" when qualifying for initial calibration criteria.

12.3 Are any $\overline{RRF}$s < 0.050 (< 0.010 for poor performers)? ✓ [ ] ___

ACTION: Circle all outliers in red.

ACTION: If any $\overline{RRF}$ values are < 0.05 or < 0.01 for poor performers, qualify associated non-detects unusable (R) and associated positive results estimated (J).

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance the analytes that fail %RSD and/or RRF criteria.

12.4 Are there any transcription/calculation errors in the reporting of RRFs, RRFs or %RSD values? (Check at least 2 values, but if errors are found, check more.) ___ [✓] ___

ACTION: Circle errors in red.

ACTION: If errors are large, contact the TOPO to obtain an explanation/resubmittal from the lab, document in the Data Assessment under Contract Problems/Non-Compliance.

13.0 GC/MS Continuing Calibration Verification (CCV) (Form VII)

13.1 Are the Continuing Calibration Forms (Form VII) present and complete for the volatile fraction? [✓] ___ ___

13.2 Did the 12 hour clock begin with either the injection of BFB or in cases where a closing CCV can be used as an opening CCV for each instrument? [✓] ___ ___

ACTION: If any forms are missing or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, ask the TOPO to obtain explanation/resubmittal from the laboratory. If continuing calibration data are unavailable, flag all associated sample data as unusable (R).

13.3 Do any volatile compounds have a % Difference (% D) between the initial $\overline{RRF}$ and CCV RRF exceeding ± 50% for 1,4-Dioxane, ± 40% for the poor performers or ± 30% for the remaining compounds? ___ [✓] ___

ACTION: Circle all outliers in red.

13.4 Do any volatile compounds have a RRF < 0.05 or < 0.01 for the poor performers? ✓ [ ] ___

ACTION: Circle all outliers in red.

YES NO N/A

. . . .

Note: Verify that the CCV was run at the required frequency (an opening and closing CCV must be run within 12-hour period) and the CCV was compared to the correct initial calibration. If the mid-point standard from the initial calibration is used as an opening CCV, verify that the result (RRF) of the mid-point standard was compared to the average RRF from the correct initial calibration.

Note: The closing CCV used to bracket the end of a 12-hour analytical sequence may be used as the opening CCV for the new 12-hour analyical sequence, provided that all the technical acceptance criteria are met for an opening CCV (see table below). If the closing CCV does not meet the technical acceptance criteria for an opening CCV, then a BFB tune followed by an opening CCV is required and the next 12-hour time period begins with the BFB tune.

Action: Use the following table to qualify data based on the technical acceptance criteria for the opening CCV and closing CCV.

<u>Continuing Calibration Verification (CCV) Actions for Trace Volatiles Analyses</u>

Criteria for Opening CCV	Criteria for Closing CCV	Action	
		Detected Associated Compounds	Non-Detected Associated Compounds
RRF < 0.010 (poor responders) RRF < 0.050 (all other volatile target compounds)	RRF < 0.010 (for all volatile target compounds)	J	R
RRF ≥ 0.010 (poor responders) RRF ≥ 0.050 (for all other compounds)	RRF ≥ 0.010 (for all target volatile compounds)	No Action	
%D > 50.0 or < -50.0 (1,4-Dioxane) %D > 40.0 or < -40.0 (poor responders) %D > 30.0 or < -30.0 (all other volatile target compounds)	%D > 50.0 or < -50.0 (for all volatile target compounds)	J	UJ
%D ≤ 50.0 or ≥ -50.0 (1,4-Dioxane) %D ≤ 40.0 or ≥ -40.0 (poor responders) %D ≤ 30.0 or ≥ -30.0 (all other volatile target compounds)	%D ≤ 50.0 or ≥ -50.0 (for all volatile target compounds)	No Action	
Opening CCV not performed at required frequency *	Closing CCV not performed at required frequency *	R	

* See section 13.2 above

YES NO N/A

. . . .

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance if more than two of the required analytes failed the above acceptance criteria.

13.5 Are there any transcription/calculation errors for the reporting of RRFs, or %D between initial RRFs and continuing RRFs? (Check at least two values but if errors are found, check more.) ___ [✓] ___

ACTION: Circle errors with red pencil.

ACTION: If errors are large, notify the TOPO to obtain explanation/resubmittals from the lab. Document errors in the Contract Problems/Non-Compliance section of the Data Assessment.

Note: All DMCs must meet RRF $\geq$ 0.010. No qualification of the data is necessary on the DMC RRF and %RSD/% Diff data <u>alone</u>. However, use professional judgment to evaluate the DMC RRF and %RSD/% Diff data in conjunction with the DMC recoveries to determine the need for qualification of data.

14.0 <u>Internal Standard (Form VIII)</u>

14.1 Were the internal standard area counts for every sample and blank within the range of 60.0% and 140.0% of its response in the most recent opening CCV standard calibration? [✓] ___ ___

If no, were affected sample reanalyzed? [ ] ___ ✓

ACTION: 1. Circle all outliers with red pencil.

14.2 Are the retention times of the internal standards in sample or blanks within ±20 seconds from the RT of the internal standard in the 12-hour associated calibration standard (opening CCV or mid-point standard from initial calibration)? [✓] ___ ___

Action: Use the following table to qualify the data

<u>INTERNAL STANDARDS ACTIONS FOR TRACE VOLATILES</u>

Criteria	ACTION	
	Detected Associated Compounds *	Non-detected Associated Compounds *

Area counts > 140% of 12-hour standard (opening CCV or mid-point standard from initial calibration)	J	No Action
Area counts < 60% of 12-hour standard (opening CCV or mid-point standard from initial calibration)	J	R
Area counts ≥ 60% but ≤ 140% of 12-hour standard (Opening CCV or mid-point standard from initial calibration)	No Action	
RT difference > 20.0 seconds between samples and 12-hour standard (Opening CCV or mid-point standard from initial calibration)	R **	
RT difference ≤ 20.0 seconds between samples and 12-hour standard (Opening CCV or mid-point standard from initial calibration)	No Action	

* For volatile compounds associated to each internal standard, see Table 3 - Trace Volatile Target Compounds and Deuterated Monitoring Compounds with Corresponding Internal Standards for Quantitation in SOM01.1, Exhibit D, available at:

Http://www.epa.gov/superfund/programs/clp/som1.htm

** Examine the chromatographic profile for that sample to determine if any false positives or negatives exist. For shifts of a large magnitude, the reviewer may consider partial or total rejection of the data for that sample fraction. Detects should not need to be qualified as unusable "R" if the mass spectral are met.

NOTE: Contract Requirements: The SOM (section 11.5.1 page D-37/Trace VOA) states that any sample which fails the acceptance criteria for IS response must be reanalyzed.

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance any sample(s) which failed the above IS acceptance criteria.

15.0 Field Duplicates

15.1 Were any field duplicates submitted for Low Concentration VOA analysis? [ ] ✓ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between duplicate results must be addressed in the reviewer narrative. If large differences exist, contact the TOPO to confirm identification of field duplicates with the sampler.

YES NO N/A

PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 35465 LAB: DATAC

SITE NAME: San German SDG No(s).: B3RR4

1.0 Chain of Custody and Sampling Trip Reports

		YES	NO	N/A
1.1	Are the Traffic Reports/Chain-of-Custody Records present for all samples?	[✓]	___	___

ACTION: If no, contact RSCC, or the TOPO to obtain replacement of missing or illegible copies from the lab.

		YES	NO	N/A
1.2	Is the Sampling Trip Report present for all samples?	[✓]	___	___

ACTION: If no, contact either RSCC or ask the TOPO to obtain the necessary information from the prime contractor.

2.0 Data Completeness and Deliverables

		YES	NO	N/A
2.1	Have any missing deliverables been received and added to the data package?	___	[✓]	___

ACTION: Contact the TOPO to obtain an explanation or resubmittal of any missing deliverables from the lab. If lab cannot provide them, note the effect on the review of the data package in the Contract Problems/Non-compliance section of the Data Assessment.

		YES	NO	N/A
2.2	Was CLASS CCS checklist included with the package?	[✓]	___	___

	YES	NO	N/A
2.3 Are there any discrepancies between the Traffic Reports/Chain-of-Custody Records, Sampling Trip Report and Sample Tags?		[✓]	

ACTION: If yes, contact the TOPO to obtain an explanation or resubmittal of any missing deliverables from the laboratory.

3.0 Cover Letter SDG Narrative

	YES	NO	N/A
3.1 Is the SDG Narrative or Cover Letter Present?	[✓]		
3.2 Are case number, SDG number and contract number contained in the SDG Narrative or cover letter (see SOW, Exhibit B, section 2.5.1)? EPA sample numbers in the SDG, detailed documentation of any quality control, sample, shipment, and/or analytical problems encountered in processing the samples? Corrective action taken?	[✓]		
3.3 Does the Narrative contain the following information SOM01.1, page B-12, section 2.5.1)? column used, storage of samples, case#, SDG#, analytical problems, and discrepancies between field and lab weights.	[✓]		
3.5 Did the contractor record the temperature of the cooler on the Form DC-1, Item 9 - Cooler Temperature, and in the SDG Narrative?	[✓]		
3.6 Does the Case Narrative contain the "verbatim" statement (page B-12, section 2.5.1 of the SOM)?	[✓]		

ACTION: If "No", to any question in this section, contact the TOPO to obtain necessary resubmittals. If unavailable, document under the Contract Problems/ Non-Compliance section of the Data Assessment.

	YES	NO	N/A

4.0 Data Validation Checklist

4.1 Check the package for the following (see SOM reporting requirements, section 2.1, page B-10):

	YES	NO	N/A
a. Is the package paginated in ascending order starting from the SDG narrative?	[✓]	___	___
b. Are all forms and copies legible?	[✓]	___	___
c. Assembled in the order set forth in the SOW?	[✓]	___	___
Semivolatiles Data present?	[✓]	___	

PART A: Low/Medium Semivolatile Analyses

1.0 Sample Conditions/Problems

	YES	NO	N/A
1.1 Do the Traffic Reports/Chain-of-Custody Records, Sampling Trip Report or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data?	___	[✓]	___

ACTION: If samples were not iced or the ice was melted upon arrival at the laboratory and the temperature of the cooler was > 10° C, then flag all positive results with a "J" and all non-detects "UJ".

2.0 Holding Times

	YES	NO	N/A
2.1 Have any SVOA technical holding times, determined from date of collection to date of analysis, been exceeded?	___	[✓]	___

2.2 Preservation: Aqueous and Non-aqueous samples must be cooled at 4°C ± 2°C.

YES NO N/A

Action: Qualify sample results according to the following table.

Holding Time Actions for Low/Medium Semivolatile Analyses

Matrix	Preserved	Criteria	Action: Detected Associated Compounds	Action: Non-Detected Associated Compounds
Aqueous	No	≤ 7 days (extraction) < 40 days (analysis)	J*	UJ*
Aqueous	No	> 7 days (extraction) > 40 days (analysis)	J	UJ
Aqueous	Yes	≤ 7 days (extraction) ≤ 40 days (analysis)	No qualification	No qualification
Aqueous	Yes	> 7 days (extraction) > 40 days (analysis)	J	UJ
Aqueous	Yes/No	Grossly Exceeded	J	R
Non-aqueous	No	≤ 14 days (extraction) ≤ 40 days (analysis)	J*	UJ*
Non-aqueous	No	> 14 days (extraction) > 40 days (analysis)	J	UJ
Non-aqueous	Yes	≤ 14 days (extraction) ≤ 40 days (analysis)	No qualification	No qualification
Non-aqueous	Yes	> 14 days (extraction) > 40 days (analysis)	J	UJ
Non-aqueous	Yes/No	Grossly Exceeded	J	R

* Only if cooler temperature exceeds 10° C (see ACTION in Section 1.1 above). No action required if temperature < 10° C.

3.0 Deuterated Monitoring Compound (DMC) Recovery (Form II)

3.1 Are the Semivolatile SMC Recovery Summaries (Form II) present? [✓] ___ ___

	YES	NO	N/A
ACTION: Contact the TOPO to obtain an explanation/resubmittal from the lab. If missing deliverables are unavailable, document the effect in the Data Assessment.			
3.2 Were outliers marked correctly with an asterisk?	[✓]	___	___
ACTION: Circle all outliers in red.			
3.3 Were more than four of the sixteen (16) Deuterated Monitoring Compounds (DMC's) recoveries outside their corresponding limits?	___	[✓]	___
If yes, were samples re-analyzed?	[ ]	___	✓
Were method blanks re-analyzed?	[ ]	___	✓

Note: Up to four (4) DMCs per sample may fail % recovery but all % recoveries must be > zero.

ACTION: If any DMC is outside the required limits, qualify their associated target compounds (See Table below) as follows:

SEMIVOLATILE DMC AND THEIR ASSOCIATED TARGET COMPOUNDS

Phenol-d5 Benzaldehyde Phenol	2-Chlorophenol-d4 2-Chlorophenol	2-Nitrophenol-d4 Isophorone 2-nitrophenol
Bis(2-Chloroethyl)ether-d8 bis(2-Chloroethyl)ether 2,2'oxybis(1-Chloropropane bis(2-Chloroethoxy)methane	4-Methylphenol-d8 2-Methylphenol 4-Methylphenol 2,4 Dimethylphenol	4-Chloroaniline-d4 4-Chloroaniline Hexachloro cyclopentadiene 3,3'Dichlorobenzidine

YES NO N/A

Nitrobenzene-d8 Acetophenone N-Nitro-di-n-propylamine Hexachloroethane Nitrobenzene 2,6-Dinitrotoluene 2,4-Dinitrotoluene N-Nitrodiphenylamine	**2,4-Dichlorophenol-d3** 2,4-Dichlorophenol Hexaclorobutadiene 4-Chloro-3-methylphenol 2,4,6-Trichlorophenol 2,4,5-Trichlorophenol 1,2,4,5-Tetrachloro-benzene Pentachlorophenol 2,3,4,6-Tetrachloro-phenol	**Dimethylphthalate-d6** Caprolactam 1,1'-Biphenyl Dimethylphthalate Diethylphthalate Di-n-butylphthalate Butylbenzylphthalate bis(2-Ethylhexyl)-phthalate Di-n-octylphthalate
Fluorene-d10 Dibenzofuran Fluorene 4-Chlorophenyl-phenylether 4-Bromophenyl-phenylether Carbazole	**Anthracene-d10** Hexachlorobenzene Atrazine Phenanthrene Anthracene	**Pyrene-d10** Fluoranthene Pyrene Benzo(a)anthracene Chrysene
Acenaphthylene-d8 Naphthalene 2-Methylphthalene 2-Chlorophthalene Acenapthylene Acenaphthene	**4-Nitrophenol-d4** 2-Nitroaniline 3-Nitroaniline 2,4-Dinitrophenol 4-Nitrophenol 4-Nitroaniline	**Benzo(a)pyrene-d12** Benzo(b)flurOanthene Benzo(k)fluroanthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenzo(a,h)anthracene Benzo(g,h,i)pertlene
4,6-Dinitro-2-methylphenol-d2 4,6-Dinitro-2-methylphenol		

YES NO N/A

. . . .

Semivolatile Deuterated Monitoring Compound Recovery Limits for Selective Ion Monitoring (SIM) and the Associated Target Compounds

Fluoranthene-d10 (DMC)	2-Methylnaphthalene-d10 (DMC)
Fluoranthene	Naphthalene
Pyrene	2-Methylnaphthalene
Benzo(a)anthracene	Acenaphthylene
Chrysene	Acenaphthene
Benzo(b)fluoranthene	Fluorene
Benzo(k)fluoranthene	Pentachlorophenol
Benzo(a)pyrene	Phenanthrene
Indeno(1,2,3-cd)pyrene	Anthracene
Bibenzo(a,h)anthracene	
Benzo(g,h,i)perylene	

SEMIVOLATILE DEUTERATED MONITORING COMPOUND RECOVERY LIMITS

DMC	Recovery Limits (%) for Water Samples	Recovery Limits (%) for Soil samples
Phenol-d5	39 - 106	17 - 103
Bis-(2-chloroethyl) ether-d8	40 - 105	12 - 9
2-Chlorophenol-d4	41 - 106	13 - 101
4-Methylphenol-d8	25 - 111	8 - 100
Nitrobenzene-d5	43 - 108	16 - 103
2-Nitrophenol-d4	40 - 108	16 - 104
2,4-Dichlorophenol-d3	37 - 105	23 - 104
4-Chloroaniline-d4	1 - 145	1 - 145
Dimethylphthalate-d6	47 - 114	43 - 111

YES NO N/A

. . . .

Acenaphthalate-d8	41 - 107	20 - 97
4-Nitrophenol-d4	33 - 116	16 - 166
Fluorene-d10	42 - 111	40 - 108
4,6-Dintro-2-methylphenol-d2	22 - 104	1 - 121
Anthracene-d10	44 - 110	22 - 98
Pyrene-d10	52 - 119	51 - 120
Benzo(a)pyrene-d12	32 - 121	43 - 111
Fluoranthene-d10 (SIM)	5- - 150	50 - 150
2-Methylnaphthalene-d10 (SIM)	50 - 150	50 - 150

Deuterated Monitoring Compound Recovery Action for Semivolatiles

Criteria	Action	
	Detected Associated Compounds	Non-Detected Associated Compounds
%R > Upper Acceptance Limit	J	No qualification
%R < Lower acceptance Limit	J	UJ
Lower Acceptance ≤ %R ≤ Upper Acceptance Limit	No qualification	

NOTE: Use the above table to qualify SVOA data including SIM analysis.

NOTE: As per SOM, any sample which has more than 4 DMC's outside the limits, it must be reanalyzed (SOM sec. 11.4.3.1 pg. D-49/Low Medium SVOA).

Blank analysis have DMCs out of specification: Basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. For example, if one or more samples in the batch show acceptable DMC recoveries, the reviewer may choose to consider the blank problem to be an isolated occurrence.

YES NO N/A

ACTION: Note in the Data Assessment under Contract Problems/ Non-Compliance if the Lab did not perform reanalysis and reviewer's judgment regarding blank problem.

3.4 Are there any transcription/calculation errors between raw data and form II? ___ [✓] ___

ACTION: If large errors exist, ask the TOPO to obtain an explanation/resubmittal from the lab, make any necessary corrections and note errors in the data assessment.

4.0 Matrix Spike/Matrix Spike Duplicate Recovery (Form III)

Note: Data for MS/MSD will not be present unless requested.

4.1 Are the MS/MSD Recovery Forms (Form III BNA) present? [ ] ✓ ___

4.2 Was the MS/MSD analyzed at the required frequency (once per SDG, or every 20 samples, whichever is more frequent)? [ ] ✓ ___

ACTION: If any MS/MSD data are missing, take action as specified in section 3.1 above.

ACTION: No action is taken on MS/MSD data alone. However, using professional judgement, the validator may use the MS and MSD results in conjunction with other QC criteria and determine the need for some qualification of the data. If Any MS/MSD % recovery or RPD is out of specification, qualify data to include the consideration of the existence of interference in the raw data. Consideration include, but not limited to the following "Action":

Matrix Spike/Matrix Spike Duplicate Action for Semivolatiles

Criteria	Action	
	Detected Spike Compounds	Non-detected Spike Compounds

YES NO N/A

%R or RPD > Upper Acceptance Limit	J	No qualification
%R < Lower Acceptance Limit	J	Use Professional Judgment
Lower Acceptance Limit ≤ %R; RPD ≤ Upper Acceptance Limit	No qualification required	

Note: If it can be determined that the results of the MS/MSD affects only the sample spiked, limit qualification to only this sample. However, use professional judgment when it is determined through the MS/MSD results that the laboratory is having systematic problem in the analysis of one or more analytes that affect all associated samples.

5.0 Method Blanks (Form IV)

5.1 Is the Semivolatile Method Blank Summary (Form IV BNA) present for aqueous and soil samples? [✓] ___ ___

5.2 Frequency of Analysis: For the analysis of SVOA TCL compounds, has a method blank been analyzed for each SDG or every 20 samples, whichever is more frequent? [✓] ___ ___

5.3 Has a SVOA method blank been analyzed after the calibration standards and once every 12 hours time period for each GC/MS instrument used? [✓] ___ ___

5.4 No target compound concentration may exceed the upper limit of the initial calibration. Did the laboratory perform dilution on compounds exceeding the initial calibration upper limit. [✓] ___ ___

ACTION: If any method blank data is missing or dilution was not done, notify the TOPO to obtain resubmittals or an explanation from the lab. If method blank data are unavailable, the reviewer may use professional judgement, or substitute field blank or trip blank data for missing method blank data.

5.5 Chromatography: Review the blank raw data chromatogram (RICs), quant. Reports or data system printout and spectra. Is the

YES NO N/A

. . . .

chromatographic performance (baseline stability) acceptable for each instrument? [✓] ___ ___

ACTION: Use professional judgement to determine the effect on the data.

5.6 The validator should verify that the correct identification scheme for EPA blanks was used. (See SOM page B-39, section 3.3.7.3 for more information.)

Was the correct identification scheme used for all BNA blanks? [✓] ___ ___

ACTION: Contact the TOPO to obtain corrections from the lab, or make the necessary corrections. Document in the "Contract Problems/Non-Compliance section of the Data Assessment all corrections made by the validator.

5.8 Are all detected hits for target compounds in method, and field blanks less than the CRQL? [✓] ___ ___

<u>Exception</u>: Bis(2-ethylhexyl)phthalate must be less than 5X times their respective CRQLs listed in the method.

ACTION: If no, an explanation and laboratory's corrective actions must be addressed in the case narrative. If the narrative contains no explanation, then make a note in the Contract Problems/Non-Compliance section of the Data Assessment.

6.0 <u>Contamination</u>

NOTE: "Water blanks", "drill blanks", and distilled water blanks" are validated like any other sample, and are <u>not</u> used to qualify data. Do not confuse them with the other QC blanks discussed below.

Note: These limits are <u>not</u> advisory.

	YES	NO	N/A
6.1 Do any method blanks contain positive SVOA results (TCL and/or TICs)?	✓	[ ]	
6.2 Do any field/rinse blanks have positive SVOA results (including TICs)?		[ ]	✓

NOTE: All field blank results associated with a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for system monitoring compound, instrument performance criteria, spectral or calibration QC problems.

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks. If any blanks are grossly contaminated, all associated sample data should be qualified unusable (R).

Blank Action for Semivolatile Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required

YES NO N/A

	Gross contamination	Detects	Qualify results as unusable R
	TIC: aqueous	> 5x blank value	R
	TIC: non-aqueous	> 5x blank value	R

* 5x the CRQL for bis(2-ethylhexyl)Phthalate

NOTE: Analytes qualified "U" for blank contamination are treated as "hits" when qualifying for calibration criteria.

Note: When applied as described in the table above, the contaminant concentration in the blank are multiplied by the sample dilution factor.

6.3 Are there field/rinse/equipment blanks associated with every sample? [ ] ___ ___

ACTION: Note in data assessment that there is no associated field/rinse/equipment blank.

<u>Exception</u>: samples taken from a drinking water tap do not have associated field blanks.

7.0 GC/MS Instrument Performance Check (Form V)

7.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for decafluorotriphenylphosphine (DFTPP)? [ ] ___ ___

7.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? [ ] ___ ___

7.3 Did the 12-hour clock begin with either the injection of DFTPP, or in cases where a closing continuing calibration (CCV) was used as an opening CCV? [ ] ___ ___

Listed below are some, but not necessarily all, examples of acceptable analytical sequences incorporating the use of the opening/closing CCV.

YES NO N/A

. . . .

Use these examples as a guide for possible analytical sequences that can be expected.

Conditions for When Example Sequence is Appropriate:	Acceptable Criteria That Must be Met:	Notes:
If time remains on the 12 hour clock after initial calibration sequence	• DFTPP tunes meet instrument performance criteria. • The five initial calibration standards meet initial calibration criteria. • CCV A meets both opening and closing CCV criteria • CCV B meets closing CCV criteria.	The requirement of starting the new 12-hr clock for Analytical Sequence 2 with a new DFTPP tune is waived if CCV A meets opening CCV criteria. If CCV B meets opening CCV criteria, a method blank and subsequent samples may be analyzed immediately after CCV B.
If time remains on the 12 hour clock after initial calibration sequence	• DFTPP tunes meet instrument performance criteria. • The five initial calibration standards meet initial calibration criteria. • CCV A meets closing CCV criteria (but does not meet opening CCV criteria). • CCV B meets opening CCV criteria. • CCV C meets closing CCV Criteria.	CCV A does not meet opening criteria, therefore a new DFTPP tune must be performed, immediately followed by CCV B before a method blank and any sample may be analyzed. In this case, the new 12 hr clock and Analytical Sequence 2 begins with the injection of the new DFTPP tune.
If more than 12 hrs have elapsed since the most recent initial calibration or closing CCV. OR If the most recent closing CCV was not or could not be used as an opening CCV.	• DFTPP tunes meet instrument performance criteria. • CCV A meets opening CCV criteria. • CCV B meets both opening and closing CCV criteria. • CCV C meets both opening and closing CCV criteria.	The requirement of starting the new 12 hour clock for Analytical Sequence 2 with a new DFTPP tune is waived if CCV B meets opening CCV criteria. If CCV C meets opening CCV criteria, a method blank and subsequent samples may be analyzed immediately after CCV B.

YES NO N/A

If more than 12 hrs have elapsed since the most recent initial calibration or closing CCV OR If the most recent closing CCV was not or could not be used as an opening CCV	• DFTPP tunes meet instrument performance criteria. • CCV A meets opening CCV criteria. • CCV B meets closing CCV criteria (but does not meet opening CCV criteria). • CCV C meets opening CCV Criteria. • CCV D meets both opening and closing CCV criteria.	CCV B does not meet opening CCV criteria, therefore a new DFTPP tune must be performed, immediately followed by CCV B before a method blank and any samples may be analyzed. In this case, the new 12 hr clock and Analytical Sequence 2 begins with the injection of the new DFTPP tune. The requirement of starting the new 12 hr clock for Analytical Sequence 3 with a new DFTPP tune is waived if CCV D meets opening CCV criteria. If CCV D meets opening criteria, a method blank and subsequent samples may be analyzed after CCV B.

7.4 Have the ion abundances been normalized to m/z 198? [✓] ___ ___

NOTE: All ion abundance ratios must be normalized to m/z 198, the nominal base peak, even though the ion abundance of m/z 442 may be up to 100% that of m/z 198.

ACTION: If mass assignment is in error, qualify all associated data as unusable (R).

7.5 Have the ion abundance criteria been met for each instrument used? [✓] ___ ___

ACTION: If ion abundance criteria are not met, professional Judgement to determine to what extent the data may be utilized.

NOTE: Guidelines to aid in the application of professional judgment in evaluating ion abundance criteria are discussed below:

a. Some of the most critical factors in the DFTPP criteria are the non—instrument specific requirements that are also not unduly affected by the location of the spectrum on the chromatographic profile. The m/z ratios for 198/199 and 442/443 are critical. These ratios are based on the natural abundance of carbon 12 and carbon 13 and should always be met. Similarly, the relative abundance of m/z 68, 70, 197, and 441 indicate the condition of the instrument and the suitability of the resolution adjustment. Note that all of the foregoing

YES NO N/A

abundance relate to adjacent ions; they are relatively insensitive to differences in instrument design and position of the spectrum on the chromatographic profile.

b. For the ions at m/z 51, 127, and 275, the actual relative abundance is not as critical. For instance, if m/z 275 has 80.0% relative abundance (criteria 10.0-60.0%) and other criteria are met, the deficiency is minor.

c. The relative abundance of m/z 365 is an indicator of suitable instrument zero adjustment. If relative abundance for m/z 365 is zero, minimum detection limits may be affected. On the other hand, if m/z 365 is present, but < 0.75% minimum abundance criteria, the deficiency is not as serious.

7.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.)

7.7 Is the number of significant figures for the reported relative abundances consistent with the number given in the ion abundance criteria column on Form V ?

ACTION: If large errors exist, take action as specified in section 3.1 above.

7.8 Is the spectrum of the mass calibration compound acceptable?

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

8.0 Target Compound List (TCL) Analytes (Form I)

8.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate?

b. Regional Control/MS/MSD samples?

c. Blanks (method, field, etc)?

8.2 Are the SVOA Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following:

a. Samples and/or fractions as appropriate?

	YES	NO	N/A
b. Regional Control/MS/MSD samples?	[ ]	___	✓
c. Blanks (method, field, etc)?	[✓]	___	___

ACTION: If any data are missing, take action specified in 3.1 above.

8.3 Is chromatographic performance acceptable with respect to:

	YES	NO	N/A
Baseline stability?	[✓]	___	___
Resolution?	[✓]	___	___
Peak shape?	[✓]	___	___
Full-scale graph (attenuation)?	[✓]	___	___
Other: ____________________?	[ ]	___	✓

ACTION: Use professional judgement to determine the acceptability of the data.

	YES	NO	N/A
8.4 Are lab-generated standard mass spectra of the identified SVOA compounds present for each sample?	[✓]	___	___

ACTION: If any mass spectra are missing, take action as specified in 3.1 above. If lab does not generate their own standard spectra, make note under the "Contract Problems/Non-Compliance" section of the Data Assessment. If spectra are unavailable reject "R" the reported results.

	YES	NO	N/A
8.5 Is the RRT of each reported compound within ± 0.06 RRT units of the standard RRT in the continuing calibration verification or initial calibration mid-point standard?	[✓]	___	___
8.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum?	[✓]	___	___
8.7 Do sample and standard relative ion intensities agree to within ± 20% between standard and sample spectra?	[✓]	___	___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in sections 8.4-8.7 above.

YES NO N/A

. . . .

ACTION: When sample carry-over is suspected, use professional judgment to determine if instrument cross-contamination has affected positive compound identifications.

9.0 Tentatively Identified Compounds (TIC)

9.1 Are all Tentatively Identified Compound Forms (Form I SVOA-TIC) present? Do listed TICs include scan number or retention time, as well as the estimated "J" and/or "JN" qualifier? [✓] ___ ___

9.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate? [✓] ___ ___

b. Blanks? [✓] ___ ___

ACTION: If any TIC data are missing, take action specified in 3.1 above.

ACTION: Verify "JN" qualifier is present for all chemically named TICs having a percent match of greater than or equal 85%. TICs labeled "unknown" are qualified with a "J" qualifier.

9.3 Are any target compounds (from any fraction) listed as TICs? (Example: 1,2-dimethylbenzene is xylene - a VOA target analyte - and should not be reported as a TIC.) ___ [✓] ___

ACTION: Flag with "R" only target compound detected in another fraction. (except blank contamination - see blank table in sec 6.3 above)

9.4 Are major ions present in the reference mass spectrum with a relative intensity greater than 10% also present in the sample spectrum? [✓] ___ ___

9.5 Do TICs and "best match" reference spectra relative ion intensities agree within ± 20%? [✓] ___ ___

ACTION: Use professional judgement to determine the acceptability of TIC identifications. If it is determined that an incorrect identification was made, change its identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate.

YES NO N/A

Action: When a compound is not found in any blank, but is detected in a sample and is a suspected artifact of a common laboratory contaminant, solvent preservatives or Aldo condensation, the result should be qualified as unusable (R). (i.e., common lab contaminants such as CO_2(m/e 44), Siloxanes (m/e 73), diethyl ether, hexane, certain freons and phthalates at < 100 ug/L. Aldol condensation products: 4-hydroxy-4-methyl-2-pentanone, 4-methyl-2-penten-2-one, and 5,5-dimethyl-2(H)-furanone. Solvent preservatives cyclohexene, and related by-products: cyclohexanone, cyclohexenone, cyclohexanol, cyclohexenol, chlorocyclohexene, and chlorocyclohexanol.).

10.0 <u>Compound Quantitation and Reported Detection Limits</u>

10.1 Are there any transcription/calculation errors in Form I results? (Check at least two positive values. Verify that the correct internal standards, quantitation ions, and RRFs were used to calculate Form I results.) ___ [ ] ___

10.2 Are the CRQLs adjusted to reflect sample dilutions? [ ] ___ ___

ACTION: If errors are large, take action as specified in section 3.1 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQLs data from the diluted sample). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and its corresponding value on the original Form I and substituting the data from the diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's not to be used, including any in the data summary package.

10.3 For non-aqueous samples, were the percent moisture < 70%? [ ] ___ ___

Action: If the % moisture ≥ 70.0% and < 90.0%, qualify detects as "J" and non-detects as approximated "UJ" If the % Moisture ≥ 90%, qualify detects as "J" and non-detects as "R"

11.0 <u>Standards Data (GC/MS)</u>

11.1 Are the reconstructed ion chromatograms, and data system printouts (quant. reports) present for each initial and continuing calibration? [ ] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.1 above.

12.0 <u>GC/MS Initial Calibration (Form VI)</u>

YES NO N/A

. . . .

12.1 Are the Initial Calibration Forms (Form VI SVOA) present and complete for the semivolatile target compounds (except seven listed below) at concentrations of 5, 10, 20, 40, and 80 µg/ℓ and 4-point calibration at 10, 20, 40, and 80 ug/L for 2,4-dinitrophenol, pentachlorophenol, 2-nitroaniline, 3-nitroaniline, 4-nitroaniline, 4-nitrophenol and 4,6-dinitro-2-methylphenol? [✓] ___ ___

Note: If analysis by Selected Ion Monitoring (SIM) technique is requested for PAHs/pentachlorophenols, calibration standards are analyzed at 0.10, 0.20, 0.40, 0.80 and 1.0 ng/uL for each target compound of interest and the associated DMCs. Pentachlorophenol will require only a four-point initial calibration at 0.20, 0.40, 0.80 and 1.0 ng/uL.

ACTION: If any Initial Calibration forms are missing, take action as specified in section 3.1 above.

12.2 Are the relative standard deviation (RSD) stable for VOA's over the concentration range of the calibration (i.e., %RSD ≤ 20%, and ≤ 40% for poor performers (see table below))? [✓] ___ ___

ACTION: Circle all outliers in red.

NOTE: The twenty two (25) poor performers compounds and associated DMCs are listed below. The relative response factor (RRF) for these compounds must be greater than or equal to 0.010. The RRF for all other BNA target compounds must be ≥ 0.050.

<u>Semivolatile Compounds Exhibiting Poor Response</u>

Semivolatile Compounds	
2,2'-Oxybis(1-chloropropane)	Benzaldehyde
4-Chloroaniline	4-Nitroaniline
Hexachlorobutadiene	4,6-Dinitro-2-methylphenol
Hexachlorocyclopentadiene	N-Nitrosodiphenylamine
2-Nitroaniline	3,3'Dichlorobenzidine
3-Nitroaniline	1,1'Biphenyl
2,4-Dinitrophenol	Dimethylphthalate
4-Nitrophenol	Diethylphthalate

YES NO N/A

Acetophenone	1,2,4,5-Tetrachlorobenzene
Caprolactam	Carbazole
Atrazine	Butylbenzylphthalate
Di-n-butylphthalate	Di-n-octylphthalate
Bis-2(ethylhexyl)phthalate	

NOTE: Analytes previously qualified "U" for blank contamination are still treated as "hits" when qualifying for initial calibration criteria.

12.3 Are any RRFs < 0.050 (< 0.010 for poor performers)? ___ [✓] ___

ACTION: Circle all outliers in red.

ACTION: Use the following table to qualify for detects and non-detect compounds.

Initial Calibration Actions for Semivolatile Analyses

Criteria for Semivolatile Analysis	Action	
	Detected Associated Compounds	**Non-Detected Associated Compounds**
RRF < 0.010 (compounds exhibiting poor response) RRF < 0.050 (all other target compounds)	J	R
RRF ≥ 0.010 (compounds exhibiting poor response) RRF ≥ 0.050 (all other target compounds)	No qualification	
%RSD ≤ 40.0% (compounds exhibiting poor response) %RSD ≤ 20.0% (all other target compounds)	No qualification	
%RSD > 40.0% (compounds exhibiting poor response) %RSD > 20.0% (all other target compounds)	J	No qualification

ACTION: Document in the Data Assessment Report the analytes that fail %RSD and/or RRF criteria.

12.4 Are there any transcription/calculation errors in the reporting of RRFs, RRFs or %RSD values? (Check at least 2 values, but if errors are found, check more.) ___ [✓] ___

ACTION: Circle errors in red.

YES NO N/A

ACTION: If errors are large, contact the TOPO to obtain an explanation/resubmittal from the lab, document in the Data Assessment under Contract Problems/Non-Compliance.

13.0 GC/MS Continuing Calibration Verification (CCV) (Form VII)

13.1 Are the Continuing Calibration Forms (Form VII SVOA) present and complete for the volatile fraction? [✓] ___ ___

13.2 Did the 12 hour clock begin with either the injection of DFTPP or in cases where a closing CCV can be used as an opening CCV for each instrument? [✓] ___ ___

ACTION: If any forms are missing or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, ask the TOPO to obtain explanation/resubmittal from the laboratory. If continuing calibration data are unavailable, flag all associated sample data as unusable (R).

13.3 Do any semivolatile compounds have a % Difference (% D) between the initial RRF and CCV RRF exceeding ± 40% for the poor performers (see table/page 22) or ± 25% for the remaining compounds? ___ [ ]

ACTION: Circle all outliers in red.

13.4 Do any semivolatile compounds have a RRF < 0.05 or < 0.01 for the poor performers? ___ [✓] ___

ACTION: Circle all outliers in red.

Note: Verify that the CCV was run at the required frequency (an opening and closing CCV must be run within 12-hour period) and the CCV was compared to the correct initial calibration. If the mid-point standard from the initial calibration is used as an opening CCV, verify that the result (RRF) of the mid-point standard was compared to the average RRF from the correct initial calibration.

Note: The closing CCV used to bracket the end of a 12-hour analytical sequence may be used as the opening CCV for the new 12-hour analyical sequence, provided that all the technical acceptance criteria are met for an opening CCV (see table below). If the closing CCV does not meet the technical acceptance criteria for an opening CCV, then a DFTPP tune followed by an opening CCV is required and the next 12-hour time period begins with the DFTPP tune.

Action: Use the following table to qualify data based on the technical acceptance criteria for the opening CCV and closing CCV.

Continuing Calibration Verification (CCV) Actions for Low/Medium Semivolatiles Analyses

YES NO N/A

Criteria for Opening CCV	Criteria for Closing CCV	Action	
		Detected Associated Compounds	Non-Detected Associated Compounds
RRF < 0.010 (poor responders) RRF < 0.050 (for all other compounds)	RRF < 0.010 (for all target compounds)	J	R
RRF ≥ 0.010 (poor responders) RRF ≥ 0.050 (all other target compounds)	RRF ≥ 0.010 (for all target compounds)	No Action	
%D > 40.0 or < -40.0 (poor responders) %D > 25.0 or < -25.0 (all other volatile target compounds)	%D > 50.0 or < -50.0 (for all target compounds)	J	UJ
%D ≤ 40.0 or ≥ -40.0 (poor responders) %D ≤ 25.0 or ≥ -25.0 (all other target compounds)	%D ≤ 50.0 or ≥ -50.0 (for all target compounds)	No Action	
Opening CCV not performed at required frequency *	Closing CCV not performed at required frequency *	R	

* The 12-hour clock begins with either the injection of DFTPP or in cases where a closing CCV can be used as an opening CCV, the 12-hour clock begins with the injection of the opening CCV.

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance if more than two of the required analytes failed the above acceptance criteria.

13.5 Are there any transcription/calculation errors for the reporting of RRFs, or %D between initial RRFs and continuing RRFs? (Check at least two values but if errors are found, check more.) ___ [1] ___

ACTION: Circle errors with red pencil.

ACTION: If errors are large, notify the TOPO to obtain explanation/resubmittals from the lab. Document errors in the Contract Problems/Non-Compliance section of the Data Assessment.

Note: All DMCs must meet RRF ≥ 0.010. No qualification of the data is necessary on the DMCs RRF and %RSD/%Diff data alone. However, use professional judgment to evaluate the DMC and %RSD/% Diff data in conjunction with the DMC recoveries to determine the need of qualification of the data.

14.0 Internal Standard (Form VIII)

YES NO N/A

. . . .

14.1 Were the internal standard area counts for every sample and blank within the range of 50.0% and 200.0% of its response from the associated 12-hour calibration (opening CCV or mid-point initial calibration standard? [✓] ___ ___

If no, were affected sample reanalyzed? [ ] ___ ✓

ACTION: 1. Circle all outliers with red pencil.

14.2 Are the retention times of the internal standards in sample or blanks within ± 30 seconds from the RT of the internal standard in the 12-hour associated calibration standard (opening CCV or mid-point standard from initial calibration)? [✓] ___ ___

Action: Use the following table to qualify the data

INTERNAL STANDARDS ACTIONS FOR LOW/MEDIUM SEMIVOLATILES

Criteria	ACTION	
	Detected Associated Compounds *	**Non-detected Associated Compounds ***
Area counts ≥ 50% and ≤ 200% of 12-hour standard (opening CCV or mid-point standard from initial calibration)	No Action	required
Area counts < 50% of 12-hour standard (opening CCV or mid-point standard from initial calibration)	J	R
Area counts > 200% of 12-hour standard (Opening CCV or mid-point standard from initial calibration)	J	No Action
RT difference > 30.0 seconds between samples and 12-hour standard (Opening CCV or mid-point standard from initial calibration)	R	
RT difference ≤ 30.0 seconds between samples and 12-hour standard (Opening CCV or mid-point standard from initial calibration)	No Action required	

* For semivolatile compounds associated to each internal standard, see Table 2-Semivolatile standards corresponding Target and Deuterated Monitoring Compounds for Quantitation in SOM01.1, Exhibit D, available at:

Http://www.epa.gov/superfund/programs/clp/som1.htm

Examine the chromatographic profile for that sample to determine if any false positives or negatives exist. For shifts of a large magnitude, the reviewer may consider partial or total rejection of the data for that sample fraction. Detects should not need to be qualified as unusable "R" if the mass spectral are met.

NOTE: Contract Requirements: The SOM (section 11.4.4 page D-50/SVOA Low/Medium states that any sample which fails the acceptance criteria for internal standard response must be reanalyzed.

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance any sample(s) which failed the above IS acceptance criteria.

15.0 Field Duplicates

15.1 Were any field duplicates submitted for Low Concentration SVOA analysis? [ ] / ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between duplicate results must be addressed in the reviewer narrative. If large differences exist, contact the TOPO to confirm identification of field duplicates with the sampler.

YES NO N/A

PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 35465 LAB: DATAC

SITE NAME: San German SDG No(s).: B3XR4

1.0 Chain of Custody and Sampling Trip Reports

1.1 Are the Traffic Reports/Chain-of-Custody Records present for all samples? [✓] ___ ___

ACTION: If no, contact RSCC, or the TOPO to obtain replacement of missing or illegible copies from the lab.

1.2 Is the Sampling Trip Report present for all samples? [✓] ___ ___

ACTION: If no, contact either RSCC or ask the TOPO to obtain the necessary information from the prime contractor.

2.0 Data Completeness and Deliverables

2.1 Have any missing deliverables been received and added to the data package? ___ [✓] ___

ACTION: Contact the TOPO to obtain an explanation or resubmittal of any missing deliverables from the lab. If lab cannot provide them, note the effect on the review of the data package in the Contract Problems/Non-compliance section of the Data Assessment.

2.2 Was SMO/CLASS CCS checklist included with the package? [✓] ___ ___

	YES	NO	N/A
2.3 Are there any discrepancies between the Traffic Reports/Chain-of-Custody Records, and Sampling Trip Report?	___	[✓]	___

ACTION: If yes, contact the TOPO to obtain an explanation or resubmittal of any missing deliverables from the laboratory.

3.0 Cover Letter SDG Narrative

	YES	NO	N/A
3.1 Is the SDG Narrative or Cover Letter Present?	[✓]	___	___
3.2 Are case number, SDG number and contract number contained in the SDG Narrative or cover letter (see SOW, Exhibit B, section 2.5.1)? EPA sample numbers in the SDG, detailed documentation of any quality control, sample, shipment, and/or analytical problems encountered in processing the samples? Corrective action taken?	[✓]	___	___
3.3 Does the Narrative contain the following information SOM01.1, page B-12, section 2.5.1)? column used, storage of samples, case#, SDG#, analytical problems, and discrepancies between field and lab weights.	[✓]	___	___
3.5 Did the contractor record the temperature of the cooler on the Form DC-1, Item 9 - Cooler Temperature, and in the SDG Narrative?	[✓]	___	___
3.6 Does the Case Narrative contain the "verbatim" statement (page B-12, section 2.5.1 of the SOM)?	[✓]	___	___

ACTION: If "No", to any question in this section, contact the TOPO to obtain necessary resubmittals. If unavailable, document under the Contract Problems/ Non-Compliance section of the Data Assessment.

	YES	NO	N/A

4.0 Data Validation Checklist

4.1 Check the package for the following (see SOM reporting requirements, section 2.1, page B-10):

	YES	NO	N/A
a. Is the package paginated in ascending order starting from the SDG narrative?	[✓]	___	___
b. Are all forms and copies legible?	[✓]	___	___
c. Assembled in the order set forth in the SOW?	[✓]	___	___
d. All Aroclor Data present?	[✓]	___	___

PART A: Low/Medium Aroclor Analyses

1.0 Sample Conditions/Problems

	YES	NO	N/A
1.1 Do the Traffic Reports/Chain-of-Custody Records, Sampling Trip Report or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data?	___	[✓]	___

ACTION: If samples were not iced or the ice was melted upon arrival at the laboratory and the temperature of the cooler was > 10° C, then flag all positive results with a "J" and all non-detects "UJ".

2.0 Holding Times

	YES	NO	N/A
2.1 Have any Aroclor technical holding times, determined from date of collection to date of analysis, been exceeded?	___	[✓]	___

2.2 Preservation: Aqueous and Non-aqueous samples must be cooled at 4°C ± 2°C.

YES NO N/A

. . . .

ACTION: Qualify sample results according to the following table.

Holding Time Actions for Low/Medium Aroclor Analyses

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤ 7 days (extraction) < 40 days (analysis)	J*	UJ*
	No	> 7 days (extraction) > 40 days (analysis)	J	UJ
	Yes	≤ 7 days (extraction) ≤ 40 days (analysis)	No qualification	
	Yes	> 7 days (extraction) > 40 days (analysis)	J	UJ
	Yes/No	> 28 Days (extraction)	J	R
Non-aqueous	No	≤ 14 days (extraction) ≤ 40 days (analysis)	J*	UJ*
	No	> 14 days (extraction) > 40 days (analysis)	J	UJ
	Yes	≤ 14 days (extraction) ≤ 40 days (analysis)	No qualification	
	Yes	> 14 days (extraction) > 40 days (analysis)	J	UJ
	Yes/No	> 28 Days (extraction)	J	R

* Only if cooler temperature exceeds 10°C (see ACTION in Section 1.1 above).
No action required if temperature ≤ 10°C.

3.0 **Surrogate Recovery (Form II ARO-1, Form II ARO-2, Form VIII ARO)**

3.1 Are the Aroclor Recovery Summary Forms present? [✓] ___ ___

ACTION: Contact the TOPO to obtain an explanation/resubmittal from the lab. If missing deliverables are unavailable, document the effect in the Data Assessment.

	YES	NO	N/A
3.2 Were the two surrogates, tetrachloro-m-xylene (TCX) and decachlorobiphenyl (DCB) added to all samples, MS/MSD, LCS, blanks including standards?	[✓]	___	___

ACTION: If no, use professional judgment in qualifying data as missing surrogate analyte may not directly apply to target analytes.

	YES	NO	N/A
3.3 Were outliers marked with an asterisk on Form II?	[✓]	___	___

ACTION: Circle all outliers with a red <u>pencil</u>.

	YES	NO	N/A
If yes, were effected samples re-analyzed?	[✓]	___	___

3.4 The RTs of the surrogates in each mid-point Aroclor standards used for continuing calibration verification, all samples, including MS/MSD, LCS and all blanks must be within the calculated RT window. TCX must be within $\pm$ 0.05 minutes and DCB must be within $\pm$ 0.10 minutes of the mean retention time (RT) determined from the initial calibration and tabulated in Form VIII Pest.

	YES	NO	N/A
Were any outliers marked with an asterisk on Form VIII ARO?	___	[✓]	___

ACTION: Circle all outliers with a red <u>pencil</u>. If any Surrogate is outside the required limits, qualify their associated target compounds (See Table below) as follows:

<u>Surrogate Compound Recovery Action for Pesticides</u>

Criteria	Action	
	Detected Target Compounds	Non-Detected Target Compounds
%R > 200%	J	No qualification
150% < %R ≤ 200%	J	No qualification
30% ≤ %R ≤ 150%	No qualification	
10% ≤ %R < 30%	J	UJ
%R < 10% (sample dilution not a factor)	J	R
%R < 10% (sample dilution is a factor)	Use professional judgment	
RT out of RT window	Use professional judgment	
RT within RT window	No qualification	

YES NO N/A

Note: Blank analysis having surrogates out of specification:

The reviewer must give special consideration to the validity of associated samples. Basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. For example, if one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose to consider the blank problem to be an isolated occurrence.

ACTION: Note in the Data Assessment under Contract Problems/ Non-Compliance if the Lab did not perform reanalysis and reviewer's judgment regarding blank problem.

3.5 Are there any transcription/calculation errors between raw data and Form IIs? ___ [✓] ___

ACTION: If large errors exist, ask the TOPO to obtain an explanation/resubmittal from the lab, make any necessary corrections and note errors in the data assessment.

4.0 Matrix Spike/Matrix Spike Duplicate Recovery (Form III)

Note: Data for MS/MSD will not be present unless requested.

4.1 Are the MS/MSD Recovery Forms (Form III ARO) present? [✓] ___ ___

4.2 Was the MS/MSD analyzed at the required frequency (once per SDG, or every 20 samples, whichever is more frequent)? [✓] ___ ___

ACTION: If any MS/MSD data are missing, take action as specified in section 3.1 above.

ACTION: No action is taken on MS/MSD data alone. However, using professional judgement, the validator may use the MS and MSD results in conjunction with other QC criteria and determine the need for some qualification of the data. If Any MS/MSD % recovery or RPD is out of specification, qualify data to include the consideration of the existence of interference in the raw data. Consideration include, but not limited to the following "Action":

Matrix Spike/Matrix Spike Duplicate Action for Aroclor

Criteria	Action	
	Detected Spike Compounds	Non-detected Spike Compounds
%R or RPD > Upper Acceptance Limit	J	No qualification
20% ≤ %R < Lower Acceptance Limit	J	UJ

YES NO N/A

. . . .

%R < 20%	Use professional judgment
Lower Acceptance Limit ≤ %R; RPD ≤ Upper Acceptance Limit	No qualification

Note: If it can be determined that the results of the MS/MSD affects only the sample spiked, limit qualification to only this sample. However, use professional judgment when it is determined through the MS/MSD results that the laboratory is having systematic problem in the analysis of one or more analytes that affect all associated samples.

5.0 **Blanks (Form IV)**

5.1 Is the Aroclor Method Blank Summary (Form IV ARO) present for aqueous and soil samples? [✓] ___ ___

5.2 Frequency of Analysis: For the analysis of AROCLOR, has a method blank been analyzed for each SDG or every 20 samples, whichever is more frequent? [✓] ___ ___

ACTION: If any blank data are missing, take action as specified above in section 3.1. If blank data is not available, reject "R" all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

5.3 A separate Form IV should be present if part of an extraction batch required sulfur removal. In such cases some samples will be listed on two blank summary forms - once under the method blank, and once under the sulfur clean-up blank (PCBLK). Was this additional blank raw data and Form IV submitted when required? [✓] ___ ___

ACTION: If Form IV sulfur clean-up blank is missing, take action as specified in section 3.1 above.

5.4 Has a Aroclor instrument blank been analyzed at the beginning of every 12 hr. period following the initial calibration sequence (minimum contract requirement)? [✓] ___ ___

ACTION: If any blank data are missing, take action specified in Section 3.1.

5.5 Was the correct identification scheme used for all Aroclor blanks? (See page B-39, section 3.3.7.3 of SOM01.1 for further information) [✓] ___ ___

ACTION: Contact the TOPO to obtain resubmittals or make the required corrections on the forms.

YES NO N/A

Document in the Data Assessment under Contract Problems/Non-Compliance all corrections made by the validator.

5.6 Chromatography: Review the blank raw data chromatogram, quant. Reports and data system printout. Is the chromatographic performance (baseline stability) acceptable for each instrument? [✓] ___ ___

ACTION: Use professional judgement to determine the effect on the data.

5.7 Are all detected hits for target compounds in method, and field blanks less than the CRQL? [✓] ___ ___

ACTION: IF no, an explanation and laboratory's corrective actions must be addressed in the case SDG narrative. Contact TOPO to request from Lab. revised narrative and make a note in the Contract Problems/Non-Compliance section of the Data Assessment.

6.0 Contamination

NOTE: "Water blanks", "drill blanks", and distilled water blanks" are validated like any other sample, and are not used to qualify data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/reagent or cleanup blanks contain positive hits for target Aroclor compounds with values greater than the CRQL for that analyte? ___ [✓] ___

Note: The concentration of each target compound in the instrument blank must be less than the CRQL for that analyte.

ACTION: Make note in data assessment under Contract Problems/Non-Compliance if any blank contains hit above the CRQLs.

6.2 Do any instrument blanks contain positive Aroclor results with values greater than CRQLs? ___ [✓] ___

ACTION: Take the action specified in section 6.1.

6.3 Do any field/rinse blanks have positive Aroclor results? ___ [✓] ___

NOTE: All field blank results associated with a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for system monitoring compound, instrument performance criteria, spectral or calibration QC problems.

ACTION: Follow the directions in the table below to qualify results due to contamination. Use the largest value from all the associated

YES NO N/A

blanks. If any blanks are grossly contaminated, all associated sample data should be qualified unusable (R).

Blank Action for Aroclor Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field, Sulfur Cleanup, Instrument	Detects	Not detected	No qualification required
	< CRQL	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required
	Gross contamination	Detects	Qualify results as unusable R

NOTE: Analytes qualified "U" for blank contamination are treated as "hits" when qualifying for calibration criteria.

Note: When applied as described in the table above, the contaminant concentration in the blank are multiplied by the sample dilution factor.

6.4 Are there field/rinse/equipment blanks associated with every sample? [✓] ___ ___

ACTION: Note in data assessment if there's no associated field/rinse/equipment blank.

<u>Exception</u>: samples taken from a drinking water tap do not have associated field blanks.

7.0 <u>Aroclor Initial and Continuing Calibration</u>

7.1 Are the following Forms, chromatograms and data system printouts present?

a.) Form VI ARO-1/Aroclor Initial Calibration (Multipoint) [✓] ___ ___

YES NO N/A

b.) Form VI ARO-2/Aroclor Initial Calibration (Multipoint) [✓] ___ ___

c.) Form VI ARO-2/Aroclor Initial Calibration(Singlepoint) [✓] ___ ___

d.) Form VII ARO/Aroclor Calibration Verification [✓] ___ ___

e.) Form VIII ARO/Aroclor Analytical Sequence [✓] ___ ___

f.) Form X ARO/Identification Summary for Multicomponent Analysis [✓] ___ ___

7.2 **Initial Calibration**

7.2.1 Was the following contract required initial calibration sequence provided by the laboratory? [✓] ___ ___

Initial Calibration Sequence	
1.	Aroclor 1221 CS3
2.	Aroclor 1232 CS3
3.	Aroclor 1242 CS3
4.	Aroclor 1248 CS3
5.	Aroclor 1254 CS3
6.	Aroclor 1262 CS3
7.	Aroclor 1268 CS3
8.	Aroclor1016/1260 (100 ng/ml) CS1
9.	Aroclor1016/1260 (200 ng/ml) CS1
10.	Aroclor1016/1260 (400 ng/ml) CS1
11.	Aroclor1016/1260 (800 ng/ml) CS1
12.	Aroclor1016/1260 (1600 ng/ml) CS1
13.	Instrument Blank

ACTION: If initial calibration is not performed or not performed in the proper sequence, notify the TOPO and make a note in the data assessment.

7.3 Are there any transcription/calculation errors between raw data and the Forms? ___ [✓] ___

ACTION: If large errors exist, take action specified in section 3.1 above.

YES NO N/A

7.4 Mean Retention Time (RT) and RT Window

Were the following mean RT and RT window met: [✓] ___ ___

a.) The mean RT of each of the three to five major peaks were determined from the five-point initial calibration for all Aroclors

b.) RT window was calculated as ± 0.07 for each of the three to five major peaks and ± 0.05 and ± 0.10 for the surrogates tetrachloro-m-xylene and decachlorobiphenyl, respectively.

ACTION: If no, follow the action as specified in section 3.1.

7.5 Was at least one chromatogram from each of the Aroclor standards yield peaks that give deflection between 50-100% of full scale? [✓] ___ ___

ACTION: IF no, take action as specified in section 3.1.

7.6 Was the mean Calibration Factor (CF) calculated for the three to five major peaks of each Aroclor, as well as for the surrogates, over the initial calibration range? [✓] ___ ___

7.7 Were the Percent Relative Standard Deviation (%RSD) of the Calibration Factor for the three to five major peaks < 20% of each of the Aroclor compounds and surrogates? [✓] ___ ___

ACTION: If no, take action as specified in the following Table.

Initial Calibration Action for Aroclor Analyses

Criteria	Action	
	Detected Associated Compounds	Non-Detected Associated Compounds
Initial calibration is not performed or not performed in proper sequence	Use Professional Judgment and notify Contract Lab Program (CLP) Project Officer	
%RSD exceeds allowable limits *	J	UJ
%RSD within allowable limits *	No qualification	

* %RSD < 20.0% for Aroclors and surrogates (tetrachloro-m-xylene and decachlorobiphenyl.

7.8 Continuing Calibration Verification (CCV) (Form VII)
Were the Absolute Retention Time (RT) for each Aroclor and surrogate in the mid-point concentration (CS3) of

YES NO N/A

the Standard used for CCV must be within the RT window determined from the initial calibration?

7.9 For opening CCV, or closing CCV that is used as an opening CCV for the next 12-hour period, the Percent Difference (%D) between the CF of each of the three to five peaks used to identify an Aroclor and surrogates in the mid-point concentration (CS3) of the Aroclor standards and the CF from the initial calibration must be within ±15.0%.

7.10 For a closing CCV, the %D between the CF of each of the three to five peaks used to identify an Aroclor and surrogates in the mid-point concentration (CS3) of the Aroclor standards and the CF from the initial calibration must be within ±50.0%.

7.11 No more than 14 hours may elapse from the injection of the instrument Blank that begins an analytical sequence (opening CCV) and the injection of the last mid-point concentration (CS3) of the Aroclor standards that ends an analytical sequence (closing CCV).

7.12 No more than 12 hours may elapse from the injection of the instrument blank that begins an analytical sequence (opening CCV and the injection of the last sample or blank that is part of the same analytical sequence.

Were sections 7.8 to 7.12 met? [✓] ___ ___

ACTION: If no, use the following table to qualify Aroclor data:

<u>Continuing Calibration Verification (CCV) Action for Aroclor Analyses</u>

Criteria	Action	
	Detected Associated Compounds	Non-Detected Associated Compounds
RT out of RT Window	Use professional Judgment *	
Percent Difference not within limits ± 15% as specified in section 7.9 above	J	UJ
Percent Difference not within limits ± 50% as specified in section 7.10 above	J	UJ
Time elapsed is greater than acceptable limits as specified in section 7.11 & 7.12 above	R	
Percent Difference, time elapsed and RT are within acceptable limits	No qualification	

YES NO N/A

* For non-detected target compounds in the affected samples, check to see if the sample chromatogram contain any peak that are close to the expected RT window of the Aroclor of interest.

If no peaks are present, consider the non-detected values to be valid and no qualification of the data is necessary.

If any peaks are present close to the expected RT window of the Aroclor of interest, qualify the non-detected values as presumptively present "N".

For detected compounds in the affected samples, if the peaks are within the RT window, no qualification of the data is necessary. If the peaks are close to the expected RT window of the Aroclors of interest, the reviewer may take additional effort to determine if sample peaks represent the compound of interest.

For example, the reviewer can examine the data package for the presence of three or more standards containing the Aroclor of interest that were run within the analytical sequence during which the sample was analyzed. If three or more such standards are present, the RT window can be re-evaluated using the mean RT of the standards.

If the peaks in the affected sample fall within the revised window, qualify the detected Aroclor as "NJ".

If the reviewer cannot do anything with the data to resolve the problem of concern, qualify all non-detects as unuseable "R".

8.0 Analytical Sequence Check (Form VIII-ARO)

8.1 Is Form VIII-Pest present and complete for each column and each period of analyses? [✓] ___ ___

ACTION: If no, take action as specified in section 3.1

8.2 Was the proper analytical sequence followed for each initial calibration and subsequent analyses, and all standards analyzed at the required frequency for each GC/ECD instrument used? [✓] ___ ___

ACTION: If no, use professional judgment to determine the severity of the effect on the data and qualify accordingly. Generally, the effect is negligible unless the sequence was grossly altered and/or the calibration was out of QC limits.

8.3 Are the surrogate retention time (RT) from the initial calibration for TCX and DCB provided on Form VIII-Pest? [✓] ___ ___

	YES	NO	N/A

. . . .

ACTION: If no, take action as specified in section 3.1

8.4 Was the asterisk (*) applied to the RT of any blanks, samples, standards, MS/MSD, and LCS that did not meet the QC Limits of ± 0.05 minutes for TCX (tetrachloro-m-xylene) and ± 0.10 minutes for DCB (decachlorobiphenyl)? [✓] ___ ___

ACTION: If any data are missing, take action specified in 3.1 above.

If no, use professional judgment to determine the severity of the effect on the data and qualify accordingly. Document in the data assessment under Contract Problems/Non-Compliance.

9.0 <u>Sulfuric Acid and Gel Permeation Chromatography (GPC) Cleanup Procedures</u>

9.1 Was sulfuric acid added to all extracts? [✓] ___ ___

Note: Sulfuric acid cleanup is <u>mandatory</u> for <u>all</u> extracts

ACTION: If no, take action specified in section 3.1

9.2 <u>Gel Permeation Chromatography (GPC</u>

GPC is an optional cleanup procedure for both aqueous and non-aqueous samples that contain high molecular weight compounds that interfere with Aroclor analysis.

9.3 If GPC cleanup was performed on samples, GPC calibration is acceptable if the two UV traces meet the following requirements.

a. Peaks must be observed and should be symmetrical for all compounds in the calibration solution.

b. Corn oil and phthalate peaks should exhibit greater than 85% resolution.

c. The phthalate and Methoxychlor peaks should exhibit greater than 85% resolution.

d. Methoxychlor and perylene peaks should exhibit greater than 85% resolution.

e. Perylene and sulfur peaks must be saturated and should exhibit greater than 90% baseline resolution.

YES NO N/A

f. The RT shift is less than 5% between UV traces for bis(2-ethylhexylphthalate and perylene.

9.4 Were all above criteria met? [ ] ___ ✓

ACTION: If no, examine the raw data for the presence of high molecular weight contaminants. Examine the subsequent sample data for unusual peaks and use professional judgment in qualifying the data.

10.0 Laboratory Control Samples (LCSs)

10.1 LCSs provide information on the accuracy of the analytical method and laboratory performance.

Aroclor Laboratory Control Sample Recovery - Aqueous and Non-Aqueous

Compound	% Recovery QC Limits
Aroclor 1016	50 - 150
Aroclor 1260	50 - 150
Tetrachloro-m-xylene (surrogate)	30 - 150
Decachlorobiphenyl (surrogate)	30 - 150

NB 7/11/06

10.2 Were the above recoveries met? [✓] ___ ___ VK

ACTION: If no, qualify the sample data as follows:

Criteria	ACTION	
	Detected Associated Compound	Non-Detected Associated Compound
%R> Upper Acceptance Limit	J	No qualification
%R< Lower Acceptance Limit	J	R
Lower Acceptance Limit < %R < Upper Acceptance Limit	No qualification	

YES NO N/A

. . . .

11.0 Aroclor Identification (Form X ARO/Identification Summary for Multicomponent Analysis

11.1 Is Form X (ARO) complete for every sample in which Aroclor was detected? [✓] ___ ___

ACTION: Take action as specified in section 3.1 above.

11.2 The identification of a Multi component Aroclor by GC method is based primarily on RT data and pattern recognition. Were the following requirements met: [✓] ___ ___

a.) A Minimum of 3 major peaks were selected for each Aroclor. If more than one Aroclor is observed in a sample, a peak common to other Aroclor(s) must not be used to quantitate other Aroclor. Lab must choose different peaks to quantitate each Aroclor.

b.) If a chromatogram is replotted electronically to meet these requirements, the scaling factor used must be displayed on the chromatogram, and both the initial chromatogram and the replotted chromatogram must be submitted in the data package.

c.) The Retention Time (RT) of both of the surrogates and reported target compounds must be within the calculated RT window of both columns.

d.) When no analytes are identified in the sample, the chromatograms of the sample extract must use the same scaling factor used for the low-point standard of the initial calibration associated with those samples.

e.) Chromatogram must display the largest peak of any Aroclor detected in the sample at less than full scale.

f.) If an extract must be diluted, chromatograms must display Aroclor peaks between 25-100% of full scale.

ACTION: If retention times (RT) or peak apex cannot be verified, contact TOPO to obtain rescaled chromatograms from the lab.

If data reviewer identifies a peak in both GC columns that fall within the appropriate RT windows,

YES NO N/A

but was reported as non-detect, the compound may be false negative. If necessary, contact TOPO to instruct laboratory to re-evaluate the chromatograms.

11.3 Are there any transcription/calculation errors in Form I and Form X ARO? ___ [✓] ___

ACTION: Take action as specified in section 3.1 above.

11.4 Are the RTs of Aroclor peaks within the established RT window for analyses on both columns? [✓] ___ ___

11.5 Was the GC/MS confirmation provided for Aroclor concentration > 10 ug/ml in final extract? [ ] ✓ ___

NOTE: Laboratory is required to contact SMO to determine if GC/MS confirmation is required. Check the Semivolatile TIC data for presence of Aroclors.

11.6 Is the percent difference (%D) calculated for positive results on both columns < 25%? [✓] ___ ___

ACTION: The reviewer must check columns for peak interferences for the positive hits. Qualify the Aroclor(s) according to following Table:

Action on Qualifying Positive Aroclor Results

Percent Differences	Qualifier
0 - 25%	None
26 - 70%	"J"
71 - 100%	"JN"
101 - 200% (No Peak Interferences)	"R"
101 - 200% (Interferences detected)*	"JN"
> 50% (Aroclor value < CRQL)**	"U"
> 200%	"R"

YES NO N/A

. . . .

* When interferences is detected on either column, qualify the data as "JN"

** When the Aroclor value is below CRQL and %D > 50%, raise the value to CRQL and qualify "U", undetected.

12.0 <u>Target Aroclor List (TCL)</u>

12.1 Are the Aroclor Analysis Data Sheets (Form I ARO) present with required header information on each page for samples, MS/MSD (if required), method and instrument blanks (per column & analysis)? [✓] ___ ___

12.2 Is the chromatographic performance acceptable with respect to baseline stability, full-scale attenuation, peak shape/resolution? [✓] ___ ___

ACTION: If no, take action specified in section 3.1 above.

13.0 <u>Compound Quantitation and Reported Detection Limits</u>

13.1 Are there any transcription/calculation errors in the Form I results? Check at least two positive results. Were any errors found? [✓] ___ ___

ACTION: If errors were found, take action as specified in section 3.1 above.

13.2 Are the contract required quantitation limits (CRQL) adjusted to reflect sample dilution? [✓] ___ ___

ACTION: If errors exist, take action as specified in section 3.1 above.

ACTION: When a sample is required to be diluted, the lowest CRQL is used (unless a QC exceedance dictates the use of the higher CRQL from the diluted sample). Replace concentration which exceed the calibration range in the original analysis by crossing out the "E" value on the original Form I and substituting it with the result from the diluted sample. Specify which Form I to use. Use a red pencil and draw a red "X" across the entire page of all Form I's that should not be used, including those in the data summary package.

At the top or bottom of the Forms, write with red pencil, "DO Not Use".

YES NO N/A

Note: If the sample dilution factor (DF) is greater than 10, an additional 10 times more concentrated than the diluted sample extract must be analyzed and reported with the sample data. If the DF is less or equal to 10, but greater than 1, the results of the original undiluted analysis must also be reported (see SOM01.1/section 10.3.3.4/page D-44/ARO).

ACTION: IF the above requirement was not met, contact the TOPO to obtain an explanation/resubmittal from the lab and make a note in the Data Assessment under Contract Problems/Non-Compliance section.

14.0 Field Duplicates

14.1 Were any field duplicates submitted for Aroclor analysis? [ ] ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between duplicate results must be addressed in the reviewer narrative. If large differences exist, contact the TOPO to confirm identification of field duplicates with the sampler.

	YES	NO	N/A

PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 35465 LAB: DATAC

SITE NAME: San German SDG No(s).: B3RR4

1.0 Chain of Custody and Sampling Trip Reports

	YES	NO	N/A
1.1 Are the Traffic Reports/Chain-of-Custody Records present for all samples?	[✓]	___	___

ACTION: If no, contact RSCC, or the TOPO to obtain replacement of missing or illegible copies from the lab.

	YES	NO	N/A
1.2 Is the Sampling Trip Report present for all samples?	[✓]	___	___

ACTION: If no, contact either RSCC or ask the TOPO to obtain the necessary information from the prime contractor.

2.0 Data Completeness and Deliverables

	YES	NO	N/A
2.1 Have any missing deliverables been received and added to the data package?	___	[✓]	___

ACTION: Contact the TOPO to obtain an explanation or resubmittal of any missing deliverables from the lab. If lab cannot provide them, note the effect on the review of the data package in the Contract Problems/Non-compliance section of the Data Assessment.

	YES	NO	N/A
2.2 Was SMO/CLASS CCS checklist included with the package?	[✓]	___	___

YES NO N/A

. . . .

2.3 Are there any discrepancies between the Traffic Reports/Chain-of-Custody Records, and Sampling Trip Report? ___ [✓] ___

ACTION: If yes, contact the TOPO to obtain an explanation or resubmittal of any missing deliverables from the laboratory.

3.0 <u>Cover Letter SDG Narrative</u>

3.1 Is the SDG Narrative or Cover Letter Present? [✓] ___ ___

3.2 Are case number, SDG number and contract number contained in the SDG Narrative or cover letter (see SOW, Exhibit B, section 2.5.1)? EPA sample numbers in the SDG, detailed documentation of any quality control, sample, shipment, and/or analytical problems encountered in processing the samples? Corrective action taken? [✓] ___ ___

3.3 Does the Narrative contain the following information SOM01.1, page B-12, section 2.5.1)? column used, storage of samples, case#, SDG#, analytical problems, and discrepancies between field and lab weights. [✓] ___ ___

3.5 Did the contractor record the temperature of the cooler on the Form DC-1, Item 9 - Cooler Temperature, and in the SDG Narrative? [✓] ___ ___

3.6 Does the Case Narrative contain the "verbatim" statement (page B-12, section 2.5.1 of the SOM)? [✓] ___ ___

ACTION: If "No", to any question in this section, contact the TOPO to obtain necessary resubmittals. If unavailable, document under the Contract Problems/ Non-Compliance section of the Data Assessment.

YES NO N/A

. . . .

4.0 Data Validation Checklist

4.1 Check the package for the following (see SOM reporting requirements, section 2.1, page B-10):

a. Is the package paginated in ascending order starting from the SDG narrative? [✓] ___ ___

b. Are all forms and copies legible? [✓] ___ ___

c. Assembled in the order set forth in the SOW? [✓] ___ ___

d. All Pesticide Data present? [✓] ___

PART A: Low/Medium Pesticide Analyses

1.0 Sample Conditions/Problems

1.1 Do the Traffic Reports/Chain-of-Custody Records, Sampling Trip Report or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data? ___ [✓] ___

ACTION: If samples were not iced or the ice was melted upon arrival at the laboratory and the temperature of the cooler was > 10° C, then flag all positive results with a "J" and all non-detects "UJ".

2.0 Holding Times

2.1 Have any Pesticide technical holding times, determined from date of collection to date of analysis, been exceeded? ___ [✓] ___

2.2 Preservation: Aqueous and Non-aqueous samples must be cooled at 4°C ± 2°C.

YES NO N/A

. . . .

ACTION: Qualify sample results according to the following table.

Holding Time Actions for Low/Medium Pesticide Analyses

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤ 7 days (extraction) < 40 days (analysis)	J*	UJ*
	No	> 7 days (extraction) > 40 days (analysis)	J	UJ
	Yes	≤ 7 days (extraction) ≤ 40 days (analysis)	No qualification	
	Yes	> 7 days (extraction) > 40 days (analysis)	J	UJ
	Yes/No	> 28 Days (Gross Exceedance)	J	R
Non-aqueous	No	≤ 14 days (extraction) ≤ 40 days (analysis)	J*	UJ*
	No	> 14 days (extraction) > 40 days (analysis)	J	UJ
	Yes	≤ 14 days (extraction) ≤ 40 days (analysis)	No qualification	
	Yes	> 14 days (extraction) > 40 days (analysis)	J	UJ
	Yes/No	> 28 Days (Gross Exceedance)	J	R

* Only if cooler temperature exceeds 10°C (see ACTION in Section 1.1 above). No action required if temperature ≤ 10°C.

3.0 **Surrogate Recovery (Form II Pest-1, Form II Pest-2, Form VIII)**

3.1 Are the Pesticide Recovery Summary Forms present? [✓] ___ ___

ACTION: Contact the TOPO to obtain an explanation/resubmittal from the lab. If missing deliverables are unavailable, document the effect in the Data Assessment.

YES NO N/A

3.2 Were the two surrogates, tetrachloro-m-xylene (TCX) and decachlorobiphenyl (DCB) added to all samples, MS/MSD, LCS, blanks including standards? [✓] ___ ___

ACTION: If no, use professional judgment in qualifying data as missing surrogate analyte may not directly apply to target analytes.

3.3 Were outliers marked with an asterisk on Form II? [✓] ___ ___

ACTION: Circle all outliers with a red pencil.

If yes, were effected samples re-analyzed? [ ] ___ ✓

3.4 The RTs of the surrogates in each Performance Evaluation Mixture (PEM), mid-point Individual Standard Mixture (A and B) or (C) used for continuing calibration verification, all samples, including MS/MSD, LCS and all blanks must be within the calculated RT window. TCX must be within ± 0.05 minutes and DCB must be within ± 0.10 minutes of the mean retention time (RT) determined from the initial calibration and tabulated in Form VIII Pest.

Were any outliers marked with an asterisk on Form VIII Pest? ___ [✓] ___

ACTION: Circle all outliers with a red pencil. If any Surrogate is outside the required limits, qualify their associated target compounds (See Table below) as follows:

Surrogate Compound Recovery Action for Pesticides

Criteria	Action	
	Detected Target Compounds	Non-Detected Target Compounds
%R > 200%	J	No qualification
150% < %R ≤ 200%	J	No qualification
30% ≤ %R ≤ 150%	No qualification	
10% ≤ %R < 30%	J	UJ
%R < 10% (sample dilution not a factor)	J	R
%R < 10% (sample dilution is a factor)	Use professional judgment	
RT out of RT window	Use professional judgment	

YES NO N/A

. . . .

RT within RT window	No qualification

Note: Blank analysis having surrogates out of specification:

The reviewer must give special consideration to the validity of associated samples. Basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. For example, if one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose to consider the blank problem to be an isolated occurrence.

ACTION: Note in the Data Assessment under Contract Problems/ Non-Compliance if the Lab did not perform reanalysis and reviewer's judgment regarding blank problem.

3.5 Are there any transcription/calculation errors between raw data and Form IIs? ___ [✓] ___

ACTION: If large errors exist, ask the TOPO to obtain an explanation/resubmitta from the lab, make any necessary corrections and note errors in the dat assessment.

4.0 Matrix Spike/Matrix Spike Duplicate Recovery (Form III)

Note: Data for MS/MSD will not be present unless requested.

4.1 Are the MS/MSD Recovery Forms (Form III BNA) present? [✓] ___ ___

4.2 Was the MS/MSD analyzed at the required frequency (once per SDG, or every 20 samples, whichever is more frequent)? [✓] ___ ___

ACTION: If any MS/MSD data are missing, take action as specified in section 3.1 above.

ACTION: No action is taken on MS/MSD data alone. However, using professional judgement, the validator may use the MS and MSD results in conjunction with other QC criteria and determine the need for some qualification of the data. If Any MS/MSD % recovery or RPD is out of specification, qualify data to include the consideration of the existence of interference in the raw data. Consideration include, but not limited to the following "Action":

Matrix Spike/Matrix Spike Duplicate Action for Pesticides

YES NO N/A

. . . .

Criteria	Action	
	Detected Spike Compounds	**Non-detected Spike Compounds**
%R or RPD > Upper Acceptance Limit	J	No qualification
20% ≤ %R < Lower Acceptance Limit	J	UJ
%R < 20%	Use professional judgment	
Lower Acceptance Limit ≤ %R; RPD ≤ Upper Acceptance Limit	No qualification required	

Note: If it can be determined that the results of the MS/MSD affects only the sample spiked, limit qualification to only this sample. However, use professional judgment when it is determined through the MS/MSD results that the laboratory is having systematic problem in the analysis of one or more analytes that affect all associated samples.

5.0 Blanks (Form IV)

5.1 Is the Pesticide Method Blank Summary (Form IV PEST) present for aqueous and soil samples? [✓] ___ ___

5.2 Frequency of Analysis: For the analysis of PEST TCL compounds, has a method blank been analyzed for each SDG or every 20 samples, whichever is more frequent? [✓] ___ ___

ACTION: If any blank data are missing, take action as specified above in section 3.1. If blank data is not available, reject "R" all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

5.3 A separate Form IV should be present if part of an extraction batch required sulfur removal. In such cases some samples will be listed on two blank summary forms - once under the method blank, and once under the sulfur clean-up blank (PCBLK). Was this additional blank raw data and Form IV submitted when required? [✓] ___ ___

ACTION: If Form IV sulfur clean-up blank is missing, take action as specified in section 3.1 above.

5.4 Has a Pesticide instrument blank been analyzed at the beginning of every 12 hr. period following the initial calibration sequence (minimum contract requirement)? [✓] ___ ___

YES NO N/A

. . . .

ACTION: If any blank data are missing, take action specified in Section 3.1.

5.5 Was the correct identification scheme used for all Pesticide blanks? (See page B-39, section 3.3.7.3 of SOM01.1 for further information) [✓] ___ ___

ACTION: Contact the TOPO to obtain resubmittals or make the required corrections on the forms. Document in the Data Assessment under Contract Problems/Non-Compliance all corrections made by the validator.

5.6 <u>Chromatography</u>: Review the blank raw data chromatogram, quant. Reports and data system printout. Is the chromatographic performance (baseline stability) acceptable for each instrument? [✓] ___ ___

ACTION: Use professional judgement to determine the effect on the data.

5.7 Are all detected hits for target compounds in method, and field blanks less than the CRQL? [✓] ___ ___

ACTION: IF no, an explanation and laboratory's corrective actions must be addressed in the case SDG narrative. Contact TOPO to request from Lab. revised narrative and make a note in the Contract Problems/Non-Compliance section of the Data Assessment.

6.0 Contamination

NOTE: "Water blanks", "drill blanks", and distilled water blanks" are validated like any other sample, and are <u>not</u> used to qualify data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/reagent or cleanup blanks contain positive hits for target pesticide compounds with values greater than the CRQL for that analyte? ___ [✓] ___

Note: The concentration of each target compound in the instrument blank must be less than the CRQL for that analyte.

ACTION: Make note in data assessment under Contract Problems/Non-Compliance if any blank contains hit above the CRQLs.

6.2 Do any instrument blanks contain positive Pesticide results with values greater than CRQLs? ___ [✓] ___

ACTION: Take the action specified in section 6.1.

YES NO N/A

. . . .

6.3 Do any field/rinse blanks have positive Pesticide results? ___ [✓] ___

NOTE: All field blank results associated with a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for system monitoring compound, instrument performance criteria, spectral or calibration QC problems.

ACTION: Follow the directions in the table below to qualify results due to contamination. Use the largest value from all the associated blanks. If any blanks are grossly contaminated, all associated sample data should be qualified unusable (R).

Blank Action for Pesticide Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field, Sulfur Cleanup, Instrument	Detects	Not detected	No qualification required
	< CRQL	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contaminatio n	Report concentration of sample with a U
		≥ CRQL and ≥ blank contaminatio n	No qualification required
	Gross contamination	Detects	Qualify results as unusable R

NOTE: Analytes qualified "U" for blank contamination are treated as "hits" when qualifying for calibration criteria.
Note: When applied as described in the table above, the contaminant concentration in the blank are multiplied by the sample dilution factor.

6.4 Are there field/rinse/equipment blanks associated with every sample? [✓] ___ ___

	YES	NO	N/A

. . . .

ACTION: Note in data assessment if there's no associated field/rinse/equipment blank.

<u>Exception</u>: samples taken from a drinking water tap do not have associated field blanks.

7.0 <u>Gas Chromatography with Electron Capture Detector (GC/ECD) Instrument Performance Check (Form VI-5 thru 10, Form VII-1)</u>

7.1 Are the following Forms, chromatograms and data system printouts present?

	YES	NO	N/A
a.) Form VI Pest-5/Pesticide Resolution Check Mix	[✓]	___	___
b.) Form VI Pest-6/Performance Evaluation Mixture	[✓]	___	___
c.) Form VI Pest-7/Individual Standard Mixture A	[✓]	___	___
d.) Form VI Pest-8/Individual Standard Mixture B	[✓]	___	___
e.) Form VI Pest-9/Individual Standard Mixture C	[✓]	___	___
f.) Form VI Pest-10/Individual Standard Mixture C	[✓]	___	___
g.) Form VII Pest-1/Calibration Verification	[✓]	___	___
h.) Were the appropriate GC columns used as specified on page D-11/Pest, sections 6.26.1.3 to 6.26.1.3.2 in SOM01.1?	[✓]	___	___

7.2 The identification of a single component pesticide by GC method is based primarily on RT data. Were the following requirements met:

	YES	NO	N/A
a.) The chromatogram that results for PEM and Individual Standards Mixture analyses must display the analytes at > 10% full scale but < 100% full scale	[✓]	___	___
b.) The baseline of the chromatogram must return to below 50% of full scale before the elution of alpha-BHC, and return to below 25% of full scale after the elution time of alpha-BHC and before the elution time of decachlorobiphenyl	[✓]	___	___

NOTE: If a chromatogram is replotted electronically to meet these requirements, the scaling factor used must be displayed on the chromatogram, and if standard, blank, etc chromatogram needs to be

YES NO N/A

. . . .

replotted electronically to meet these requirements, both the initial chromatogram and the replotted chromatogram(s) must be submitted in the data package.

ACTION: If all single component pesticides (SCP) are not clearly displayed on chromatograms for all Individual Standard Mixtures and PEM, notify the TOPO to obtain resubmittal of the necessary data.

7.3 Are there any transcription/calculation errors between raw data and the Forms? [✓] ___ ___

ACTION: If large errors exist, take action specified in section 3.1 above.

7.4 Resolution Check Mixture (Form VI Pest-5)

This mixture is analyzed at the beginning of every initial calibration sequence. Were the following met: [✓] ___ ___

a.) If two Individual Standard Mixture (A and B) are used, the resolution is ≥ 60% in both GC columns or

b.) One Individual Standard Mixture C is used, the resolution between two adjacent peaks is ≥ 80% on the primary column and ≥ 50% on the secondary column.

ACTION: If no, follow the action in Action Table below.

7.5 Performance Evaluation Mixture (Form VI Pest-6)

This mixture is analyzed at the beginning (following the Resolution Check Mixture) and at the end of the initial calibration sequence. Were the following met? [✓] ___ ___

a.) The resolution between any two adjacent peaks in the initial and continuing calibration verification must be ≥ 90% on each column.

b.) The % breakdown of 4,4'-DDT and Endrin in the PEMs must be ≤ 20.0% on each column and the combined % breakdown for 4,4'-DDT and Endrin in the PEMs must be ≤ 30.0% on each column.

ACTION: IF no, take action as specified in Action Table below.

7.6 Mid-Point Individual Standard Mixture (A and B) or (C)

The resolution capabilities of the GC/ECD system used will dictate which Individual Standard Mixture can be used. This is determined by analysis of the Resolution Check Mixture (RCM) to see if the

YES NO N/A

. . . .

RCM criteria were met (see section 7.4 above). Were the following criteria met? [✓] ___ ___

a.) Mid-Point Individual Standard Mixture A and B:
See section 7.4 a.) Above

b.) Mid-Point Individual Standard Mixture C:
See section 7.4 b.) Above

ACTION: If no, take action as specified in the following Table.

Table: Gas Chromatography with Electron Capture Detector (GC/ECD) Instrument Performance Check Action

Criteria [(Individual Standard Mixture (A and B)]	**Criteria (Individual Standard Mixture C)**	**Action**
Resolution Check Mixture % Resolution <60.0%	Resolution Check Mixture % Resolution <80.0% (primary column) % Resolution <50.0% (secondary column)	Detects: NJ Non-detects: R
PEM % Resolution <90.0%		Detects: NJ Non-detects : R
PEM: 4,4'-DDT % Breakdown >20.0% and 4,4'-DDT is detected		Detects for 4,4'-DDT: J Detects for 4,4'-DDD: J Detects for 4,4'-DDE: J
PEM: 4,4'-DDT % Breakdown >20.0% and 4,4'-DDT is not detected		Non-detects for 4,4'-DDT: R Detects for 4,4'-DDD: NJ Detects for 4,4'-DDE: NJ
PEM: Endrin % Breakdown >20.0% and Endrin is detected		Detects for Endrin: J Detects for Endrin aldehyde: J Detects for Endrin ketone: J
PEM: Endrin % Breakdown >20.0% and Endrin is not detected		Detects for Endrin: R Detects for Endrin aldehyde: NJ Detects for Endrin ketone: NJ
PEM: Combined % Breakdown > 30.0%		Apply qualifiers as described above considering degree of individual breakdown

YES NO N/A

Mid-point Individual Standard Mixtures (A and B) % Resolution <90.0%	Mid-point Individual Standard Mixture (C) % Resolution <80.0% (primary column) Mid-point Individual Standard Mixture (C) % Resolution <50.0% (secondary column)	Detects: NJ Non-detects: R
PEM analysis not performed at the required frequency *		All results: R
Mid-point Individual Standard Mixtures analysis not performed at the required frequency **		All results: R

* The PEM is analyzed at the beginning (following the Resolution Check Mixture) and at the end of the initial calibration.

** Mid-point Individual Standard Mixture A and B: Analyzed as part of the initial calibration. The mid-point INDA and INDB must bracket one end of each 12-hour analytical period.

Mid-point Individual Standard Mixture C: Analyzed as part of the initial calibration. The mid-point INDC must bracket one end of each 12-hour analytical period.

7.7 Initial Calibration (Form VI Pest-2, Form VI Pest-3, Form VI Pest-3)

Were the Initial Calibration %RSD criteria met? [✓] ___ ___

ACTION: If no, qualify the data according to the following table:

Initial Calibration Action for Pesticide analyses

Criteria	Action	
	Detected Associated Compounds	**Non-Detected Associated Compounds**
Initial calibration is not performed or not performed in proper sequence	Use Professional Judgment and notify Contract Lab Program (CLP) Project Officer	
%RSD exceeds allowable limits *	J	No qualification
%RSD within allowable limits *	No qualification	

* %RSD < 20.0% for single component target compound except alpha-BHC and delta-BHC.
%RSD < 25.0% for alpha-BHC and delta-BHC.
%RSD < 30.0% for Toxaphene.
%RSD < 30.0 for surrogates (tetrachloro-m-xylene and decachlorobiphenyl).

7.8 Continuing Calibration Verification (CCV) (Form VII)

YES NO N/A

. . . .

Were the Absolute Retention Time (RT) for each Single Component Pesticide (SCP) and surrogate in the PEM and mid-point concentration of Individual Standard Mixtures (A and B) or (C) within the RT window determined from the initial calibration? [✓] ___ ___

ACTION: If no, use the following table to qualify pesticide analytes:

Continuing Calibration Verification (CCV) Action for Pesticides Analyses

Criteria	Action	
	Detected Associated Compounds	Non-Detected Associated Compounds
RT out of RT Window	Use professional Judgment *	
Percent Difference not within limits **	J	UJ
Time elapsed is greater than acceptable limits ***	R	
Percent Difference, time elapsed and RT are within acceptable limits	No qualification	

* For peaks close to the expected RT window of the pesticide of interest, the reviewer may take additional effort to determine if sample peaks represent the compound of interest. For example, the reviewer can examine the data package for the presence of three or more standards containing the pesticide of interest that were run within the analytical sequence during which the sample was analyzed. If three or more standards are present, the RT window can be re-evaluated using the mean RT of the standards. If the peak falls within the revised window, qualify detects as "NJ". Peaks that cannot be resolved with the revised window, qualify as unusable "R".

** The Percent Difference (%D) for each of the SCP and surrogates in the PEM used for CCV must be greater than or equal to -25.0% and less than or equal to 25.0%. The %D between the Calibration Factor (CF) for each of the SCP and surrogates in the Calibration Verification Standard (CS3) and the mean calibration factor from the initial calibration must be greater than or equal to -20.0% and less than or equal to 20.0%. This criteria also applies to Toxaphene.

*** No more than 14 hours may elapse from the injection of the instrument blank that begins an analytical sequence (opening CCV) and the injection of either the PEM or mid-point concentration of the Individual Standard Mixtures (A and B) or (C) that ends an analytical sequence (closing CCV). No more than 12 hours may elapse from the injection of the instrument blank that begins an analytical sequence (opening CCV) the injection of the last sample or blank that is part of the same analytical sequence. No more than 72 hours may elapse from the injection of the sample with a

YES NO N/A

Toxaphene detection and the Toxaphene Calibration Verification Standard (CS3).

8.0 **Analytical Sequence Check (Form VIII-Pest)**

8.1 Is Form VIII-Pest present and complete for each column and each period of analyses? [✓] ___ ___

ACTION: If no, take action as specified in section 3.1

8.2 Was the proper analytical sequence followed for each initial calibration and subsequent analyses, and all standards analyzed at the required frequency for each GC/ECD instrument used? [✓] ___ ___

ACTION: If no, use professional judgment to determine the severity of the effect on the data and qualify accordingly. Generally, the effect is negligible unless the sequence was grossly altered and/or the calibration was out of QC limits.

8.3 Are the surrogate retention time (RT) from the initial calibration for TCX and DCB provided on Form VIII-Pest? [✓] ___ ___

ACTION: If no, take action as specified in section 3.1

8.4 Was the asterisk (*) applied to the RT of any blanks, samples, standards, MS/MSD, and LCS that did not meet the QC Limits of $\pm$ 0.05 minutes for TCX (tetrachloro-m-xylene) and $\pm$ 0.10 minutes for DCB (decachlorobiphenyl)? [✓] ___ ___

ACTION: If any data are missing, take action specified in 3.1 above.

If no, use professional judgment to determine the severity of the effect on the data and qualify accordingly. Document in the data assessment under Contract Problems/Non-Compliance.

9.0 Florisil Cartridge (Form IX Pest-1)and Gel Permeation Chromatography (GPC) (Form IX Pest-2) Performance Check

9.1 Is Form IX Pest-1 present and complete for each lot of cartridge used? [✓] ___ ___

Note: Florisil cartridge cleanup is mandatory for all extracts

Are all samples listed on the Pesticide Cartridge Form? [✓] ___ ___

YES NO N/A

. . . .

ACTION: If no, take action specified in section 3.1

9.2 Are the percent recoveries of the target pesticides and surrogates in the Florisil performance check within 80-120% and the recovery of 2,4,5-Trichlorophenol is less than 5%? [✓] ___ ___

If the Florisil Cartridge Performance Check criteria were not met, qualify the data as follows:

Florisil Cartridge Performance Check Actions

Criteria	ACTION	
	Detected Associated Compounds	Non-Detected Associated Compounds
%R > 120% (pesticide target compounds)	J	No qualification
80% ≤ %R ≤ 120%	No qualification	
10% ≤ %R < 80% (pesticide target compounds)	J	UJ
%R < 10% (pesticide target compounds)	J	R
%R > 5% (2,4,5-Trichlorophenol)	Use professional judgment *	

* Check sample chromatogram for interferences

9.3 If GPC cleanup was performed on aqueous samples (mandatary for all soil samples), is Form IX Pest-2 present? [ ] ___ ___

Are all soil samples listed on Form IX Pest-2? [ ] ___ ___

ACTION: If no, take action as specified in section 3.1.

9.4 Were the percent recoveries of the pesticides in the GPC continuing calibration verification solution within 80 to 110%? [ ] ___ ___

ACTION: If no, qualify the sample data as follows:

Gel Permeation Chromatography (GPC) Performance Check Actions

Criteria	Action

YES NO N/A

. . . .

	Detected Associated Compounds	**Non-Detected Associated Compounds**
%R < 10% (pesticide target compounds)	J	R
10% ≤ %R < 80%	J	UJ
80% ≤ %R ≤ 110%	No qualification	
%R > 110% (pesticide target compounds)	J	No qualification

10.0 Laboratory Control Samples (LCS)

10.1 LCSs orovide information on the accurracy of the analytical method and laboratory performance.

LCS Spike Compound	**Recovery Limits (%)**	**LCS Spike Compound**	**Recovery Limits (%)**
gamma-BHC	50 - 120	Endosulfuran sulfate	50 - 120
Heptachlor epoxide	50 - 150	gamma-Chlordane	30 - 130
Dieldrin	30 - 130	Tetra-m-xylene (surrogate)	30 - 150
4,4'-DDE	50 - 150	Decachlorobiphenyl (surroagte)	30 - 150
Endrin	50 - 120		

10.2 Were the above recoveries met? [✓] ___ ___

Action: If no, qualify the sample data as follows:

Laboratory Control Sample (LCS) Actions

Criteria	**Action**	
	Detected Associated Compounds	**Non-Detected Assoicated Compounds**
%R > Upper Acceptance Limit	J	No qualification
%R < Lower acceptance Limit	J	R
Lower Acceptance Limit ≤ %R ≤ Upper Acceptance Limit	No qualification	

.0 Pesticide Identification (Form X Pest-1, Pest-2)

	YES	NO	N/A
11.1 Is Form X (Pest-1 & Pest-2) complete for every sample in which pesticide was detected?	[✓]	___	___

ACTION: Take action as specified in section 3.1 above.

	YES	NO	N/A
11.2 Are all sample chromatograms properly scaled, attenuated, etc. as required for proper identification of pesticides? (Refer to SOM01.1 sections 11.3.9 -11.3.9.7, pages D65-66)	[✓]	___	___

Note: Proper identification of pesticides depends on clear, legible presentation of the raw data. Pesticide peaks must be between 10-100% and Toxaphene between 25-100% of full scale. For any sample or blank, the baseline of the chromatogram must return below 50% of full scale before the elution time of alpha-BHC and return to 25% of full scale after the elution time of alpha-BHC and before the elution of decachlorobiphenyl.

ACTION: If retention times (RT) or peak apex cannot be verified, contact TOPO to obtain rescaled chromatograms from the lab.

	YES	NO	N/A
11.3 Are there any transcription/calculation errors in Form I and Form X Pest-1, Form X Pest-2?	[✓]	___	___

ACTION: Take action as specified in section 3.1 above.

	YES	NO	N/A
11.4 Are the RTs of pesticides within the established RT window for analyses on both columns?	[✓]	___	___
Was the GC/MS confirmation provided for pesticides concentration > 10 ug/ml in final extract?	[✓]	___	___

ACTION: Use professional judgement to qualify positive results which were not confirmed by GC/MS analysis. Check the semivolatile TIC data for presence of pesticides.

	YES	NO	N/A
11.5 Is the per cent difference (%D) calculated for positive results on both columns < 25%?	[✓]	___	___

ACTION: The reviewer must check columns for peak interferences for the positive hits. Qualify the pesticide according to following Table:

<u>Action on Qualifying Positive Pesticide Results</u>

YES NO N/A

. . . .

Percent Differences	Qualifier
0 - 25%	None
26 - 70%	"J"
71 - 100%	"JN"
101 - 200% (No Peak Interferences)	"R"
101 - 200% (Interferences detected)*	"JN"
> 50% (Pesticide value < CRQL)**	"U"
> 200%	"R"

* When interferences is detected on either column, qualify the data as "JN"

** When the pesticide value is below CRQL and %D > 50%, raise the value to CRQL and qualify "U", undetected.

12.0 Target Pesticide List (TCL)

12.1 Are the Pesticide Analysis Data Sheets (Form I Pest) present with required header information on each page for samples, MS/MSD (if required), method and instrument blanks (per column & analysis)? [✓] ___ ___

12.2 Is the chromatographic performance acceptable with respect to baseline stability, full-scale attenuation, peak shape/resolution? [✓] ___ ___

ACTION: If no, take action specified in section 3.1 above.

13.0 Compound Quantitation and Reported Detection Limits

13.1 Are there any transcription/calculation errors in the Form I results? Check at least two positive results. Were any errors found? [✓] ___ ___

ACTION: If errors were found, take action as specified in section 3.1 above.

13.2 Are the contract required quantitation limits (CRQL) adjusted to reflect sample dilution? [✓] ___ ___

ACTION: If errors exist, take action as specified in section 3.1 above.

ACTION: When a sample is required to be diluted, the lowest CRQL is used (unless a QC exceedance dictates the use of the higher CRQL from

YES NO N/A

. . . .

the diluted sample). Replace concentration which exceed the calibration range in the original analysis by crossing out the "E" value on the original Form I and substituting it with the result from the diluted sample. Specify which Form I to use. Use a red pencil and draw a red "X" across the entire page of all Form I's that should not be used, including those in the data summary package.

At the top or bottom of the Forms, write with red pencil, "DO Not Use".

Note: If the sample dilution factor (DF) is greater than 10, an additional 10 times more concentrated than the diluted sample extract must be analyzed and reported with the sample data. If the DF is less or equal to 10, but greater than 1, the results of the original undiluted analysis must also be reported (see SOM01.1/section 10.4.3.5/page D-56).

ACTION: IF the above requirement was not met, contact the TOPO to obtain an explanation/resubmittal from the lab and make a note in the Data Assessment under Contract Problems/Non-Compliance section.

13.3 For non-aqueous samples, were the percent moisture < 70%? [✓] ___ ___

Action: If the % moisture $\geq$ 70.0% and < 90.0%, qualify detects as "J" and non-detects as approximated "UJ" If the % Moisture $\geq$ 90%, qualify detects as "J" and non-detects as "R"

14.0 Field Duplicates

14.1 Were any field duplicates submitted for Pesticide analysis? [ ] ✓ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between duplicate results must be addressed in the reviewer narrative. If large differences exist, contact the TOPO to confirm identification of field duplicates with the sampler.

REFERENCE 9

Weston Solutions, Inc.
205 Campus Drive
Edison, New Jersey 08837
732-417-5800 • Fax 732-417-5801
www.westonsolutions.com

28 June 2006

Mr. Ildefonso Acosta
U.S. Environmental Protection Agency
290 Broadway - 18th Floor
New York, NY 10007-1866

Document Control No.: SAT2.20113.023.214

Subject: **Sampling Trip Report**
Work Assignment No.: 023, San German Site Discovery Initiative
Contract No.: EP-W-05-048

Dear Mr. Acosta:

Weston Solutions, Inc. (WESTON) is pleased to submit the Sampling Trip Report for the San German Site Discovery Initiative project in San German, Puerto Rico. The Region 2 Site Assessment Team 2 (SAT 2) conducted the sampling event on 20 June 2006. If you have any questions, please contact me at (732) 417-5842.

Very truly yours,

WESTON SOLUTIONS, INC.

Dennis J. Foerter, CHMM
SAT 2 Project Manager

enclosure

cc: W.S. Butterfield, SAT 2 (w/o enclosure)
A. Michael, EPA
SAT 2 project file

SAMPLING TRIP REPORT

SITE NAME:	San German Site Discovery Initiative DCN NO.: SAT2.20113.023.214 W.O. NO.: 20113.011.001.0023.00 CASE NO.: 35465
EPA I.D. NO.:	Not Applicable (Site Discovery Initiative)
SAMPLING DATE:	20 June 2006

1. Study Area: Refer to Figure 1

2. Sample Locations: Refer to Figure 1

3. Sample Descriptions: Refer to Table 1

4. Laboratories Receiving Samples:

Analysis	Name and Address of Laboratory
Target Compound List (TCL) Volatile Organic Compounds (VOCs) Base/Neutral Acids (BNA) Pesticides/Polychlorinated Biphenyls (PCBs) (Aqueous)	Datachem Laboratories, Inc. 960 West LeVoy Drive Salt Lake City, UT 84123
Target Analyte List (TAL) Metals, Mercury (Aqueous)	ChemTech Consulting Group 284 Sheffield Street Mountainside, NJ 07092

5. **Sample Dispatch Data:**

- **Seven aqueous samples for TCL VOC, BNA, and Pesticides/PCB analysis and one aqueous sample for TCL VOCs only, were shipped to Datachem Laboratories on 6/20/06 at 1700 hours via Federal Express (International Airbill No. 8392 8685 3580).**
- **Seven aqueous samples for TAL Metals (including mercury) analysis were shipped to ChemTech Consulting Group on 6/20/06 at 1700 hours via Federal Express (International Airbill No. 8392 8685 3590).**

6. **On-Site Personnel:**

Name	Company	Duties on Site
Dennis J. Foerter	WESTON	Project Manager, Site Health and Safety Officer (SHSO)
Scott Snyder	WESTON	Sampler, Global Positioning System (GPS) Operations, Sample Management Officer (SMO)
Carmen Mendez	PRASA	Well Access / Oversight

7. Additional Comments:

On 20 June 2006, WESTON personnel collected a total of seven aqueous samples (including a duplicate) from five Puerto Rico Aqueduct and Sewer Authority (PRASA) public supply wells and one PRASA filtration plant located in San German. In addition, one trip blank was collected for quality assurance/quality control (QA/QC) purposes. Samples could not be collected from the PRASA San German system's Retiro or Sambolin wells due to the fact that power was disconnected and the pumps had been removed. In addition, anticipated distribution samples were not collected because previously contaminated PRASA wells (i.e., Lola Rodriguez 1 and 2) were not pumping to the system's distribution system.

All samples were collected as part of a Site Discovery Initiative for the San German area. Aqueous samples collected by WESTON were analyzed for Target Compound List (TCL) and Target Analyte List (TAL) parameters through the EPA Contract Laboratory Program (CLP). The trip blank was analyzed for TCL VOCs only. WESTON requested a 7-day turnaround time for all analyses.

8. Report Prepared by: Dennis J. Foerter, CHMM Date: 6/28/06

9. Report Approved by: W. S. Butterfield, CHMM Date: 6/28/06

TABLE 1
SAMPLE DESCRIPTIONS
SAN GERMAN SITE DISCOVERY INITIATIVE
SAN GERMAN, PUERTO RICO

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SG-GW01	B3RR4	MB3RR4	6/20/06	0840	Groundwater sample collected from PRASA's Lola Rodriguez de Tio 1 well; Matrix Spike/Matrix Spike Duplicate (MS/MSD).
SG-GW02	B3RR5	MB3RR5	6/20/06	0910	Groundwater sample collected from PRASA's Lola Rodriquez de Tio 2 well.
SG-GW03	B3RR6	MB3RR6	6/20/06	1005	Groundwater sample collected from PRASA's El Real well.
SG-GW04	B3RR7	MB3RR7	6/20/06	1045	Groundwater sample collected from PRASA's Providencia II well.
SG-GW05	B3RR8	MB3RR8	6/20/06	1115	Groundwater sample collected from PRASA's Providencia I well.
SG-GW06	B3RR9	MB3RR9	6/20/06	1145	Groundwater sample collected from PRASA's San German Water Filtration Plant.
SG-GW07	B3RS0	MB3RS0	6/20/06	1150	Duplicate of sample SG-GW06 for Quality Assurance / Quality Control (QA/QC) purposes.
SG-TB01	B3RS8	----	6/20/06	0835	Trip Blank for QA/QC purposes.

FIGURE 1

STUDY AREA / SAMPLE LOCATION MAP

NOT INCLUDED

DP 10/24/06

ATTACHMENT 1

TRAFFIC REPORTS/CHAIN OF CUSTODY RECORDS

7

EPA USEPA Contract Laboratory Program
Organic Traffic Report & Chain of Custody Record

Case No: 35485 **R**
DAS No:

Region:	2
Project Code:	
Account Code:	
CERCLIS ID:	N/A
Spill ID:	
Site Name/State:	San German Site Discovery Initiative/PR
Project Leader:	Dennis Foerter
Action:	Screening Site Investigation
Sampling Co:	Weston - SAT 2

Date Shipped:	6/20/2006
Carrier Name:	FedEx
Airbill:	8392 8685 3580
Shipped to:	Datachem Laboratories, Inc. 960 West LeVoy Drive Salt Lake City UT 84123 (801) 266-7700

Chain of Custody Record — Sampler Signature:

	Relinquished By (Date / Time)	Received By (Date / Time)
1	6/20/06 1700	FedEx 6/20/06 1700
2		
3		
4		

ORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME	INORGANIC SAMPLE No.	QC Type
B3RR9	Ground Water/ Scott Snyder	L/G	BNA (aq) ~~(21)~~, PCB (aq) ~~(21)~~, Pest (aq) ~~(21)~~, VOC (aq) ~~(21)~~	(HCL), (Ice Only) (9)	SG-GW06	S: 6/20/2006 11:45	MB3RR9	–
B3RS0	Ground Water/ Scott Snyder	L/G	BNA (aq) ~~(21)~~, PCB (aq) ~~(21)~~, Pest (aq) ~~(21)~~, VOC (aq) ~~(21)~~	(HCL), (Ice Only) (9)	SG-GW07	S: 6/20/2006 11:50	MB3RS0	Field Duplicate

* 7 Day Turnaround for all Analyses

Shipment for Case Complete? ~~N~~ Y	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment Iced?

BNA (aq) = TCL BNAs (aqueous), PCB (aq) = TCL Aroclors (aqueous), Pest (aq) = TCL Pesticides (aqueous), VOC (aq) = TCL VOCs (aqueous)

TR Number: 2-291174636-062006-0005 **REGION COPY**

PR provides preliminary results. Requests for preliminary results will increase analytical costs.

Send Copy to: Sample Management Office Attn: Mike Benhoff, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Ph 703/818-4200; Fax

USEPA Contract Laboratory Program
Organic Traffic Report & Chain of Custody Record

Case No: 35465 **R**
DAS No:

Region:	2	Date Shipped:	6/20/2006	Chain of Custody Record		Sampler Signature:	
Project Code:		Carrier Name:	FedEx	Relinquished By	(Date / Time)	Received By	(Date / Time)
Account Code:		Airbill:	8392 8685 3580	1	6/20/06 1700	FedEx	6/20/06 1700
CERCLIS ID:	N/A	Shipped to:	Datachem Laboratories, Inc. 960 West LeVoy Drive Salt Lake City UT 84123 (801) 266-7700	2			
Spill ID:				3			
Site Name/State:	San German Site Discovery Initiative/PR			4			
Project Leader:	Dennis Foerter						
Action:	Screening Site Investigation						
Sampling Co:	Weston - SAT 2						

ORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME	INORGANIC SAMPLE No.	QC Type
B3RR7	Ground Water/ Scott Snyder	L/G	BNA (aq) ~~(21)~~, PCB (aq) (21), Pest (aq) ~~(21)~~, VOC (aq) ~~(21)~~	(HCL), (Ice Only) (9)	SG-GW04	S: 6/20/2006 10:45	MB3RR7	--
B3RR8	Ground Water/ Scott Snyder	L/G	BNA (aq) ~~(21)~~, PCB (aq) ~~(21)~~, Pest (aq) ~~(21)~~, VOC (aq) ~~(21)~~	(HCL), (Ice Only) (9)	SG-GW05	S: 6/20/2006 11:15	MB3RR8	--

2

* 7 day Turnaround for all analyses

Shipment for Case Complete? ~~N~~ Y 7	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment Iced?

BNA (aq) = TCL BNAs (aqueous), PCB (aq) = TCL Aroclors (aqueous), Pest (aq) = TCL Pesticides (aqueous), VOC (aq) = TCL VOCs (aqueous)

TR Number: 2-291174636-062006-0004

REGION COPY

PR provides preliminary results. Requests for preliminary results will increase analytical costs.

Send Copy to: Sample Management Office Attn: Mike Benhoff, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Ph 703/818-4200; Fax

USEPA Contract Laboratory Program
Organic Traffic Report & Chain of Custody Record

Case No: 35485 **R**
DAS No:

Region:	2	**Date Shipped:**	6/20/2006
Project Code:		**Carrier Name:**	FedEx
Account Code:		**Airbill:**	8392 8685 3580
CERCLIS ID:	N/A	**Shipped to:**	Datachem Laboratories, Inc. 960 West LeVoy Drive Salt Lake City UT 84123 (801) 266-7700
Spill ID:			
Site Name/State:	San German Site Discovery Initiative/PR		
Project Leader:	Dennis Foerter		
Action:	Screening Site Investigation		
Sampling Co:	Weston - SAT 2		

Chain of Custody Record

Sampler Signature:

	Relinquished By (Date / Time)	Received By (Date / Time)
1	6/20/06 1700	FedEx 6/20/06 1700
2		
3		
4		

ORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		INORGANIC SAMPLE No.	QC Type
B3RR5	Ground Water/ Scott Snyder	L/G	BNA (aq) (~~21~~), PCB (aq) (~~21~~), Pest (aq) (~~21~~), VOC (aq) (~~21~~)	(HCL), (Ice Only) (9)	SG-GW02	S: 6/20/2006	9:10	MB3RR5	–
B3RR6	Ground Water/ Scott Snyder	L/G	BNA (aq) (~~21~~), PCB (aq) (~~21~~), Pest (aq) (~~21~~), VOC (aq) (~~21~~)	(HCL), (Ice Only) (9)	SG-GW03	S: 6/20/2006	10:05	MB3RR6	–

7 day Turnaround for all analyses.

Shipment for Case Complete? ~~N~~ Y	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?**

BNA (aq) = TCL BNAs (aqueous), PCB (aq) = TCL Aroclors (aqueous), Pest (aq) = TCL Pesticides (aqueous), VOC (aq) = TCL VOCs (aqueous)

TR Number: 2-291174636-062006-0003

REGION COPY

TR provides preliminary results. Requests for preliminary results will increase analytical costs.

Send Copy to: Sample Management Office Attn: Mike Benhoff, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Ph 703/818-4200; Fax

USEPA Contract Laboratory Program
Organic Traffic Report & Chain of Custody Record

Case No: 35465 **R**
DAS No:

Region:	2	**Date Shipped:**	6/20/2006
Project Code:		**Carrier Name:**	FedEx
Account Code:		**Airbill:**	8392 8685 3580
CERCLIS ID:	N/A	**Shipped to:**	Datachem Laboratories, Inc. 960 West LeVoy Drive Salt Lake City UT 84123 (801) 266-7700
Spill ID:			
Site Name/State:	San German Site Discovery Initiative/PR		
Project Leader:	Dennis Foerter		
Action:	Screening Site Investigation		
Sampling Co:	Weston - SAT 2		

Chain of Custody Record — **Sampler Signature:**

	Relinquished By	(Date / Time)	Received By	(Date / Time)
1		6/20/06 1700	FedEx	6/20/06 1700
2				
3				
4				

ORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		INORGANIC SAMPLE No.	QC Type
B3RR4	Ground Water/ Scott Snyder	L/G	BNA (aq) ~~(21)~~, PCB (aq) ~~(21)~~, Pest (aq) ~~(21)~~, VOC (aq) ~~(21)~~	(HCL), (Ice Only) (9)	SG-GW01	S: 6/20/2006	8:40	MB3RR4	--
B3RS8	Field QC/ Scott Snyder	L/G	VOC (aq) ~~(21)~~	(HCL) (3)	TB01	S: 6/20/2006	8:35		Trip Blank

7 day Turnaround for all analyses

(=)

Shipment for Case Complete? ~~N~~ Y	**Sample(s) to be used for laboratory QC:** B3RR4	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?**

BNA (aq) = TCL BNAs (aqueous), PCB (aq) = TCL Aroclors (aqueous), Pest (aq) = TCL Pesticides (aqueous), VOC (aq) = TCL VOCs (aqueous)

TR Number: 2-291174636-062006-0001

REGION COPY

PR provides preliminary results. Requests for preliminary results will increase analytical costs.

Send Copy to: Sample Management Office Attn: Mike Benhoff, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Ph 703/818-4200

EPA USEPA Contract Laboratory Program
Inorganic Traffic Report & Chain of Custody Record

Case No: 35465 **R**
DAS No:

Region:	2	**Date Shipped:**	6/20/2006
Project Code:		**Carrier Name:**	FedEx
Account Code:		**Airbill:**	8392 8685 3590
CERCLIS ID:	N/A	**Shipped to:**	ChemTech Consulting Group (CHEM) ~~440 Route 4 Englewood NJ 07631 (201) 568-7400~~ 284 Sheffield Mountainside, NJ 07092 908 789 8900
Spill ID:			
Site Name/State:	San German Site Discovery Initiative/PR		
Project Leader:	Dennis Foerter		
Action:	Screening Site Investigation		
Sampling Co:	Weston - SAT 2		

Chain of Custody Record | **Sampler Signature:**

	Relinquished By	(Date / Time)	Received By	(Date / Time)
1		6/20/06 1700	FedEx	6/20/06 1700
2				
3				
4				

INORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		ORGANIC SAMPLE No.	QC Type
MB3RR4	Ground Water/ Scott Snyder	~~L~~/G M	In/Hg (aq) ~~(21)~~ (7)	(HNO3) (1)	SG-GW01	S: 6/20/2006	8:40	B3RR4	–
MB3RR5	Ground Water/ Scott Snyder	~~L~~/G M	In/Hg (aq) ~~(21)~~ (7)	(HNO3) (1)	SG-GW02	S: 6/20/2006	9:10	B3RR5	–
MB3RR6	Ground Water/ Scott Snyder	~~L~~/G M	In/Hg (aq) ~~(21)~~ (7)	(HNO3) (1)	SG-GW03	S: 6/20/2006	10:05	B3RR6	–
MB3RR7	Ground Water/ Scott Snyder	~~L~~/G M	In/Hg (aq) ~~(21)~~ (7)	(HNO3) (1)	SG-GW04	S: 6/20/2006	10:45	B3RR7	–
MB3RR8	Ground Water/ Scott Snyder	~~L~~/G M	In/Hg (aq) ~~(21)~~ (7)	(HNO3) (1)	SG-GW05	S: 6/20/2006	11:15	B3RR8	–
MB3RR9	Ground Water/ Scott Snyder	~~L~~/G M	In/Hg (aq) ~~(21)~~ (7)	(HNO3) (1)	SG-GW06	S: 6/20/2006	11:45	B3RR9	–
MB3RS0	Ground Water/ Scott Snyder	~~L~~/G M	In/Hg (aq) ~~(21)~~ (7)	(HNO3) (1)	SG-GW07	S: 6/20/2006	11:50	B3RS0	Field Duplicate

Shipment for Case Complete? ~~N~~ (Y)	**Sample(s) to be used for laboratory QC:** MB3RR4	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?**

In/Hg (aq) = TAL Inorganics/Mercury (aqueous)

TR Numbe[r]: 2-291174636-062006-0002 **REGION COPY**

TR provides prelim[inary] results. Requests for preliminary results will increase analytical costs.

Send Copy to: Sample Management Office Attn: Mike Benhoff, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Ph 703/818-4200; Fax

FedEx Express *International Air Waybill*
For FedEx services worldwide

Se

1 From *Please print and press hard.*

Date 06/20/06 Sender's FedEx Account Number 1080-6769-1

Sender's Name Scott Snyder Phone (732)406-8640

Company Weston Solutions, Inc.

Address c/o Mayaguez Resort : Casino

Address Route 104, Km 0.3

City Mayaguez State Province PR

Country Puerto Rico ZIP Postal Code 00680

2 To

Recipient's Name Justin Pete Phone (801)266-7700

Company Datachem Laboratories

Address 960 West LeVoy Drive Dept/Floor

Address

City Salt Lake City State Province UT

Country USA ZIP Postal Code 84123

Recipient's Tax I.D. number for Customs purposes
e.g., GST/RFC/VAT/IN/EIN, or as locally required

3 Shipment Information ☐ For EU Only: Tick here if goods are not in free circulation and provide C.I.

Total Packages Shipper's Load and Count/SLAC 4 Total Weight 280 ☐ lbs. ☐ kg DIM 26 / 15 / 18 ☐ in. ☐ cm

Commodity Description REQUIRED	Harmonized Code	Country of Manufacture	Value for Customs REQUIRED
Water Samples		USA	500 -

For U.S. Export Only: Check One
☐ No SED required per Exemption
☐ No SED required, value $2500 or less per Schedule B Commodity number
☐ SED attached (provide export license no. and exp. date or license exception symbol, w/ECCN if applicable)

Total Declared Value for Carriage

Total Value for Customs (Specify Currency) 500 - USD

4 Express Package Service *Packages up to 150 lbs. / 68 kg* *For packages over 150 lbs. (68 kg), use the FedEx Expanded Service Intl. Air Waybill.* Not all options to all

☒ FedEx Intl. Priority
☐ FedEx Intl. First Available to select locations. Higher rates apply.
☐
☐ FedEx Intl. Economy FedEx Envelope and FedEx Pak rate not available.

5 Packaging These unique brown boxes with special pricing are provided by FedEx for FedEx Intl. Priority only.

☐ FedEx Envelope ☐ FedEx Pak ☐ FedEx 10kg Box ☐ FedEx 25kg Box ☒ Other

6 Special Handling

☐ HOLD at FedEx Location ☐ SATURDAY Delivery Available to select locations. Available for FedEx Intl. Priority only.

7a Payment *Bill transportation charges to:*

☒ Sender Acct. No. in Section 1 will be billed. Enter FedEx Acct. No. or Credit Card No. below. ☐ Recipient ☒ Third Party ☐ Credit Card ☐ Cash Check/Cheque

FedEx Acct. No. 1080-6769-1 FedEx Use Only

Credit Card No.

Credit Card Exp. Date

7b Payment *Bill duties and taxes to:* ALL shipments can be subject to Customs charges, which FedEx does not estimate prior to clearance.

☒ Sender Acct. No. in Section 1 will be billed. Enter FedEx Acct. No. below. ☐ Recipient ☐ Third Party

FedEx Acct. No.

8 Your Internal Billing Reference First 24 characters will appear on invoice.

20113.011.0000.0023.00

9 Required Signature

Use of this Air Waybill constitutes your agreement to the Conditions of Contract on the back of this Air Waybill, and you represent that this shipment does not require a U.S. State Department License or contain Dangerous Goods. Certain international treaties, including the Warsaw Convention, may apply to this shipment and limit our liability for damage, loss, or delay, as described in the Conditions of Contract. WARNING: These commodities, technology, or software were exported from the United States in accordance with Export Administration Regulations. Diversion contrary to U.S. law prohibited.

Sender's Signature: Date Executed: 6/20/06

This is not authorization to deliver this shipment without a recipient signature.

For Completion Instructions, see back of fifth page.

FedEx Tracking Number 8392 8685 3580 Form I.D. No.

Try online shipping at fedex.com

The terms and conditions of service may vary from country to country. Consult our local office for specific information.
Non-Negotiable International Air Waybill • ©1994-2001 Federal Express Corporation

Questions? Visit our Web site at fedex.com.
Or in the U.S., call 800.247.4747. Outside the U.S., call your local FedEx office.

13

FedEx Express *International Air Waybill*
For FedEx services worldwide

Sender's Copy

1 From Please print and press hard.

Date 06/20/06 Sender's FedEx Account Number 1080-6769-1

Sender's Name Scott Snyder Phone (732)406-8640

Company Weston Solutions, Inc.

c/o

Address Mayaguez Resort & Casino

Address Route 104, Km 0.3

City Mayaguez State Province PR

Country Puerto Rico ZIP Postal Code 00680

2 To

Recipient's Name Parveen Hasan Phone (908)789-8900

Company Chemtech Consulting

Address 284 Sheffield St. Dept/Floor

Address

City Mountainside State Province NJ

Country USA ZIP Postal Code 07092

Recipient's Tax I.D. number for Customs purposes
e.g. GST/RFC/VAT/IN/EIN, or as locally required

3 Shipment Information ☐ For EU Only: Tick here if goods are not in free circulation and provide C.I.

Total Packages Shipper's Load and Count/SLAC 1 Total Weight 48 lbs. ☒ kg ☐ DIM L / W / H in. ☐ cm ☐

Commodity Description REQUIRED	Harmonized Code	Country of Manufacture	Value for Customs REQUIRED
Water Samples		USA	500-

For U.S. Export Only: Check One
☐ No SED required per Exemption
☐ No SED required, value $2500 or less per Schedule B Commodity number
☐ SED attached (provide export license no. and exp. date or license exception symbol, w/ECCN if applicable)

Total Declared Value for Carriage

Total Value for Customs (Specify Currency) 500- USD

4 Express Package Service *Packages up to 150 lbs./68 kg* For packages over 150 lbs. (68 kg), use the FedEx Expedited Service Intl. Air Waybill. Not all services and options are available to all destinations.

☒ FedEx Intl. Priority
☐ FedEx Intl. First Available to select locations. Higher rates apply.
☐
☐ FedEx Intl. Economy FedEx Envelope and FedEx Pak rate not available

5 Packaging These unique boxes come with special pricing are provided by FedEx for FedEx Intl. Priority only.

☐ FedEx Envelope ☐ FedEx Pak ☐ FedEx 10kg Box ☐ FedEx 25kg Box ☒ Other

6 Special Handling

☐ HOLD at FedEx Location ☐ SATURDAY Delivery Available to select locations. Available for FedEx Intl. Priority only

7a Payment *Bill transportation charges to:*

☒ Sender Acct. No. in Section 1 will be billed. — Enter FedEx Acct. No. or Credit Card No. below. — ☐ Recipient ☒ Third Party ☐ Credit Card ☐ Cash Check/Cheque

FedEx Acct. No. FedEx Use Only

Credit Card No.

Credit Card Exp. Date

7b Payment *Bill duties and taxes to:* ALL shipments can be subject to Customs charges, which FedEx does not estimate prior to clearance.

☒ Sender Acct. No. in Section 1 will be billed. — Enter FedEx Acct. No. below. — ☐ Recipient ☐ Third Party

FedEx Acct. No.

8 Your Internal Billing Reference First 24 characters will appear on invoice.

20113.011.OPTIONAL.0023.00

9 Required Signature

Use of this Air Waybill constitutes your agreement to the Conditions of Contract on the back of this Air Waybill, and you represent that this shipment does not require a U.S. State Department License or contain Dangerous Goods. Certain international treaties, including the Warsaw Convention, may apply to this shipment and limit our liability for damage, loss, or delay, as described in the Conditions of Contract. WARNING: These commodities, technology, or software were exported from the United States in accordance with Export Administration Regulations. Diversion contrary to U.S. law prohibited.

Sender's Signature: Date Executed: 6/20/06

This is not authorization to deliver this shipment without a recipient signature.

For Completion Instructions, see back of fifth page.

464

PART 157593-Rev. Date 10/01 ©1994-2001 FedEx PRINTED IN U.S.A.

FedEx Tracking Number 8392 8685 3590 Form I.D. No. 0402

Try online shipping at fedex.com

The terms and conditions of service may vary from country to country. Consult our local office for specific information. Non-Negotiable International Air Waybill • ©1994-2001 Federal Express Corporation

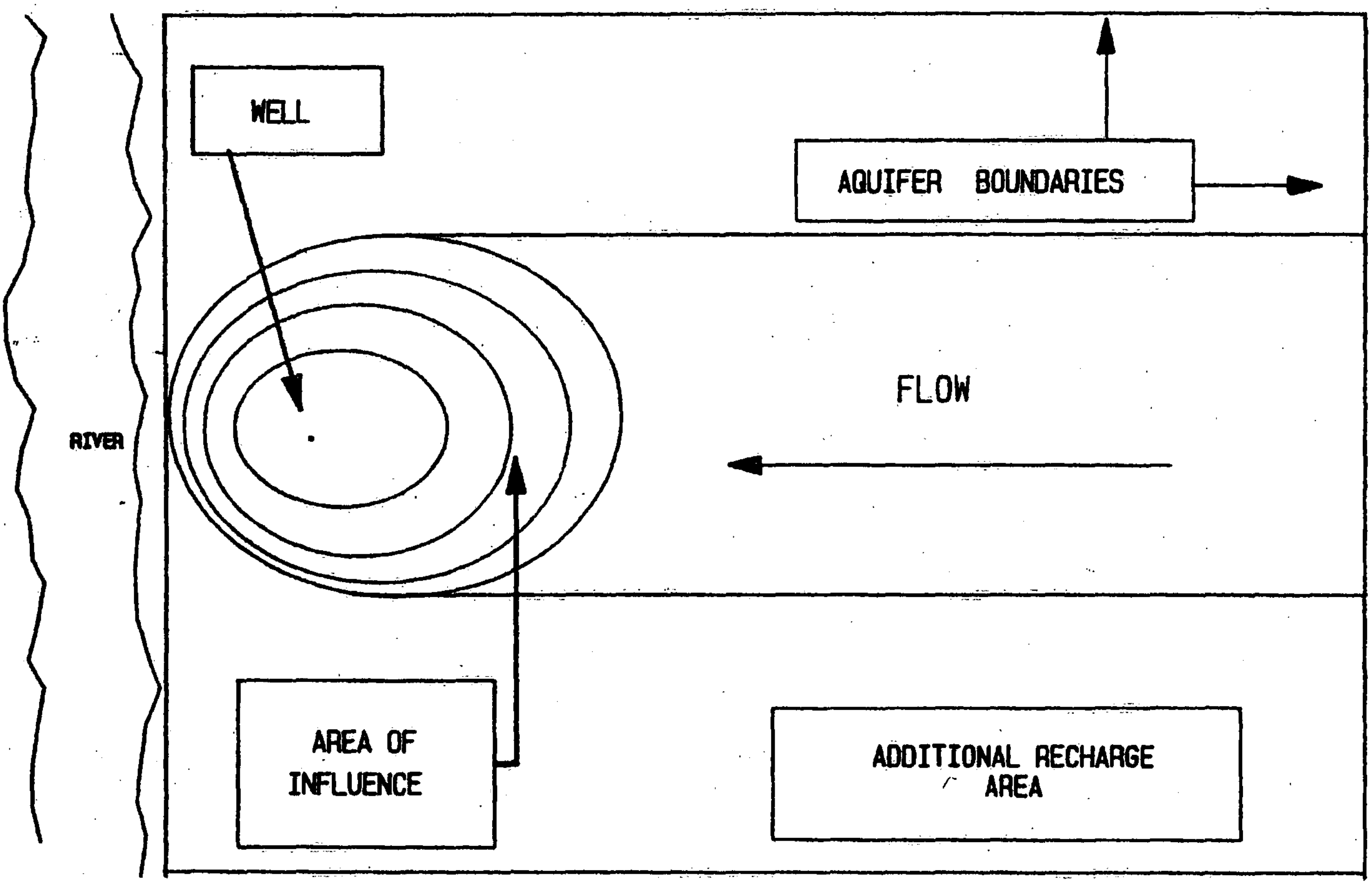
Questions? Visit our Web site at fedex.com.
Or in the U.S., call 800.247.4747. Outside the U.S., call your local FedEx office.

RETAIN THIS COPY FOR YOUR RECORDS

14

REFERENCE 10

COMMONWEALTH OF PUERTO RICO
OFFICE OF THE GOVERNOR
ENVIRONMENTAL QUALITY BOARD



FINAL

WELLHEAD PROTECTION PROGRAM

APRIL 1991

SEE NOTE RE: REFERENCE PAGINATION ON PAGE 101.
GVG

THIS PAGE WAS LEFT BLANK INTENTIONALLY

ACKNOWLEDGEMENTS

The Environmental Quality Board acknowledges the assistance and recommendations of the following Water Quality Area personnel in the development of this document:

Eric Morales: Chief, Continuous Planning Process Section

Lourdes López: Junior Environmental Sciences Specialist

Héctor F. Zayas: Computer Programmer Assistant

Environmental Technicians:

Julio C. Ríos   Pilar Díaz

Wanda Ferrer   Félix Colón

Other EQB personnel for their technical expertise and comments:

Johana Padró

Carmelo Vázquez

Genaro Torres

Rubén Gónzalez

Lissandra Concepción

Edwin Hernández

EQB gratefully acknowledges the assistance of Arturo Torres, Juan C. Puig and Orlando Ramos of the USGS for their technical expertise and help in writing Chapter 3 of this document.

Furthermore, EQB would like to thank the personnel from the following agencies which either commented this Program or helped EQB personnel in the preparation of this final document:

Puerto Rico Planning Board

Department of Natural Resources

Puerto Rico Aqueduct and Sewer Authority

Regulations and Permits Authority

University of Puerto Rico

Puerto Rico Department of Agriculture

Department of Health

The typing of this document by Cecilia Rivera, Ruth Calderón, and Yolanda Pagán is also gratefully acknowledged.

Tomás Rivera Cabrera
Director
Water Quality Area

Pedro A. Maldonado Ojeda
Chairman
Environmental Quality Board

TABLE OF CONTENTS

CHAPTER 1

THIS PAGE WAS LEFT BLANK INTENTIONALLY

Chapter 1: Introduction

In June 1986, the United States Congress approved amendments to the Safe Drinking Water Act (SDWA). Section 1428, as included in the amendments, provides a mechanism for states to protect groundwater sources of public water systems from any contaminant which may have an adverse effect on the health of persons, through the establisment of a Wellhead Protection Program (WHPP).

The amendments to the SDWA define a public water system as a system for the provision to the public of piped water for human consumption, if such system has at least 15 service connections or regularly serves at least 25 individuals. Therefore, this Program will apply to all wells and springs which meet this definition.

The SDWA also defines a wellhead protection area (WHPA) as the surface and subsurface area surrounding a water well or wellfield, supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or wellfield. The primary goal of the program is to protect the areas previously mentioned from contaminants which may pose an adverse effect on the persons which utilize the resource.

On July 31, 1986, the Honorable Governor of the Commonwealth of Puerto Rico designated the Environmental Quality Board (EQB) as the lead agency for the development, implementation and coordination of all new programs directed towards groundwater protection required by the 1986 amendments of the SDWA (See appendix 1).

In October 1988, the Environmental Protection Agency (EPA) approved the Commonwealth's "Groundwater Management and Protection

Strategy for Puerto Rico." This strategy includes a complete management and protection plan for Island groundwaters.

As part of the "Groundwater Management and Protection Strategy," EQB decided to submit to EPA a Wellhead Protection Program, which consists of the following elements, as required by Section 1428 of the SDWA:

1. Duties of state and federal agencies;
2. Methodology and procedures for delineation of WHPA's;
3. Identification of all potential contamination sources;
4. Discussion of management approaches for potential contamination sources;
5. Contingency plan; and
6. Planning process for the establishments of new wells.

These elements will be implemented through interagency coordination mechanisms as detailed in this document. An interagency committee has been established with representatives of the agencies included in Chapter II, for the development and subsequent implementation of this program. Memorandums of Agreement (MOA's) will be developed, in cases deemed necessary, to assure adequate participation and compromise in the implementation of the WHPP. It should be noted that elements 2, 3 and 4 mentioned above are very related, since it will be necessary to delineate protection areas in order to identify the pollution sources within those areas, and to then identify applicable management approaches. Some management approaches may be generalized in all settings, but others will have to be implemented on a case-by-case basis. Among the major contamination sources mentioned in Chapter 3, the

Commonwealth has not included annular injection or surface disposal of brines associated with oil and gas production since this activity is not performed in Puerto Rico. Appendix 2 includes a certification to this effect.

Elements 1, 5 and 6 can be developed and implemented independently from the other elements, but are considered an integral part of the Program.

A. Groundwater Use in Puerto Rico

The principal uses of groundwater in Puerto Rico are for human consumption in industries, commercial establishments, and the general public; for irrigation purposes in agricultural activities; and for industrial and manufacturing processes. Investigations carried out by the United States Geological Survey (USGS) indicate that approximately 175 millions of gallons per day (MGD) of groundwater are used on the Island, which represent 29.3% of the total water used in Puerto Rico, including water used in hydroelectric power plants. It is estimated that water use increases an average 1.5 MGD per year.

The use and importance of groundwater vary within each geographic zone of the Island. Along the north coast, groundwater comprises approximately 20 percent of the water used by the public water systems operated by the Puerto Rico Aqueduct and Sewer Authority (PRASA). On the south coast, almost 50 percent of the total water supply is derived from groundwaters.

Domestic use is the principal use of groundwater in Puerto Rico. In 1985 approximately 84 MGD, which is 47.9% of the total groundwater extracted, were used to supply potable water.

Agricultural uses constituted the second most important users in 1985. Aquifers provided nearly 59 MGD, or 33.4% of the total groundwaters extracted, for agricultural uses such as irrigation and livestock water supplies. Recent data indicates that this quantity reflects a decrease in agricultural uses derived from groundwater due mainly to the reduction in the production of sugarcane crops.

Industrial activities accounted for 18 MGD of groundwater extracted, mainly for uses in chemical and food processes. Pharmaceutical industries constitute the major industrial category which rely on groundwater use in Puerto Rico.

B. Principal Groundwater Deposits in Puerto Rico

The most important aquifers in Puerto Rico are found along the north and south coasts of the Island. Even though aquifers on the east and west coast have been identified, as well as in the interior valleys of Caguas, Cidra and Cayey, the importance of these is less then that of the north and south coasts. The importance of these aquifers is related to their productivity.

The phreatic or shallow aquifer of the north coast provides more than 50 MGD of groundwater for industrial, agricultural and domestic uses. The artesian or deep aquifer in this area provides more than 6 MGD of groundwaters for industrial and domestic uses, but has not been exploited as is the case of the phreatic aquifer.

The south coast aquifer provides more than 25 MGD of groundwater for agricultural, industrial and domestic uses.

C. Management of Groundwater in Puerto Rico

A series of federal and local laws are applied in Puerto Rico which regulate the use, development, and management of Island groundwaters. However, the application of these statutes is recent, thus resulting in an unplanned and not quite scientific management of groundwater resources in the past. This is why the Wellhead Protection Program becomes a preventive, legal mechanism which can provide adequate protection of our groundwaters.

At the Commonwealth level, the Environmental Quality Board (EQB) and the Department of Natural Resources (DNR) are the principal agencies responsible for the management of groundwaters. The following Commonwealth laws grant these two (2) agencies the responsibility of implementing the necessary Regulations for the use and conservation of the waters of Puerto Rico:

-Organic Law of the Department Natural Resources (Law No. 23 of June 20, 1972)

-Water Law of Puerto Rico (Law No. 136 of June 3, 1976)

-Environmental Public Policy Law (Law No. 9 of July 18, 1970)

At the Federal level, the Environmental Protection Agency (EPA) is the principal entity responsible for regulating the use and management of groundwaters. EPA may delegate to State and Commonwealth agencies the implementation of current programs which respond to laws such as, but not limited to:

-Safe Drinking Water Act of 1974 - regulates public water systems and the injection of contaminants to aquifers. The statutes pertaining to drinking water have been delegated to the Puerto Rico Department of Health (DOH), while those of underground injection have been delegated to EQB. The DOH has implemented a regulation which establishes maximum concentration levels in drinking water, including groundwaters. In 1983, EQB promulgated and extensive Underground Injection Control Regulation.

-Resource Conservation and Recovery Act - this law regulates the management of solid and toxic wastes and has been delegated to EQB.

Other federal laws related to the conservation of groundwaters include the Toxic Substances Control Act (TSCA) of 1976 which controls the production and disposal of toxic substances, and the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) of 1947, as amended, which regulates the use of chemical substances (pesticides).

The Water Resources Division of the USGS, eventhough it does not have any legal responsibilities for the management of aquifers, performs investigations on the groundwater resources of Puerto Rico. The USGS program is developed in cooperation with various Commonwealth and Federal agencies, including EQB, DNR, DOH, PRASA, Administration for Economic Development, Department of Agriculture, EPA and the Corps of Engineers of the United States Army. The program includes the operation of monitoring networks of phreatic levels, periodic groundwater surveys, as well as specific investigations of groundwater resources on the Island.

These investigations have the goal of providing information on groundwater quality and aquifers which can be used by other agencies for management and regulatory purposes.

The USGS, in cooperation with the DNR, have started to develop mathematical models which simulate groundwater flow in the principal aquifers of the Island. These models can be used to simulate the effects of additional groundwater extractions by wells, as well as changes in recharge rates (due to rainfall or artificially). Eventhough these models may be subject to errors, their precision is improved constantly as additional aquifer information is made available. Currently, DNR uses these models as one of the judgement elements in issuing franchise permits for the extraction of groundwater. Eventually, more refined models will be the principal tools utilized in the management of groundwaters and for the delineation of WHPA's.

D. **Periodic Evaluation of the Program**

To assure an effective implementation of the Program, the preparation of an annual program report will be necessary. This report will be presented to all related agencies, as well as to all legislative houses. This will serve to identify flaws in the implementation of the Program and provide time to offer and recommend corrective measures, where deemed necessary, for an adequate execution of the Program which will allow the protection of groundwaters for uses as potable water.

THIS PAGE WAS LEFT BLANK INTENTIONALLY

CHAPTER 2

THIS PAGE WAS LEFT BLANK INTENTIONALLY

Chapter 2: Duties and Resposibilities of Commonwealth and Federal Agencies

The Commonwealth of Puerto Rico has as one of it's major goals the protection of groundwaters, and in fulfillment of this goal, has developed the WHPP. Various Commonwealth and Federal agencies have the responsibility of protecting groundwaters, coordinating activities related to protection of the resource, and develop investigations to obtain information from Island aquifers. Adequate implementation of the WHPP will depend on the adequacy of coordination among these agencies.

The protection, management and conservation of groundwater resources in Puerto Rico are responsibilities of the following Commonwealth agencies: Environmental Quality Board (EQB), Department of Natural Resources (DNR), Department of Health (DOH), Puerto Rico Aqueduct and Sewer Authority (PRASA), Permits and Regulations Administration (PRA), the Puerto Rico Planning Board (PRPB), the Puerto Rico Department of Agriculture (PRDA), and the Agricultural Extension Service (AES). Federal agencies with inherence in the protection of Exten groundwaters in Puerto Rico are mainly the Environmental Protection Agency (EPA) and the United States Geological Survey (USGS).

A. Commonwealth Agencies

1. Environmental Quality Board (EQB)

EQB was created through the Environmental Public Policy Law (Law No. 9 of July 9, 1970), as amended. This agency has the responsibility to protect and manage the quality of all the waters of Puerto Rico. EQB has the authority to develop, implement and coordinate all programs directed towards the protection of the quality of groundwaters, including those stipulated by the amendments to the Safe Drinking Water Act (See Appendix 1).

As part of the management and protection of groundwaters, EQB has classified and designated uses for groundwaters, developed groundwater standards, and has developed and established regulatory and control mechanisms to prevent groundwater contamination. Among the Regulations currently in force are the: "Water Quality Standards Regulation", "Underground Injection Control Regulation", "Underground Storage Tanks Regulation", and the "Regulation for the Control of Hazardous and Non-Hazardous Substances". Furthermore, as a control and management mechanism, Compliance Certificates are granted to livestock enterprises which implement animal waste management systems. These enterprises will soon be regulated through the "Regulation for the Control of Animal Wastes Generated by Livestock Enterprises", as part of the Nonpoint Source Management Program inplace through Section 319(h) of the Clean Water Act.

Furthermore, EQB is the Commonwealth agency with the authority to excecute, receive and administrate the permit systems required by the Clean Water Act, the Clean Air Act, the Solid Wastes Disposal Act, the Resource Conservation and Recovery act, the Comprehensive Environmental Response and

Compensation Liability Act, and any other federal legislation approved by the United States Congress related to the conservation of the environment.

Other tasks performed by EQB related to groundwater protection include:

-develop and implement groundwater criteria; monitor and control contaminants which may affect the resource.

-maintain an updated inventory of potential pollution sources which may affect surface and groundwaters, such as underground storage tanks, underground injection facilities, and oxidation pounds among others.

-maintain an updated groundwater quality data bank.

-establish a register system and requirements for the installation, operation and closing of facilities with underground storage tanks.

The tasks that will be delegated to EQB within the WHPP, in addition to those previously mentioned are:

-complete coordination of the Program, including the mechanisms for the development and execution of the Program with all concerned Commonwealth and Federal agencies. This coordination will be achieved through Memorandums of Agreement (MOA's), where deemed necessary, in which the different agencies will make the commitment to perform certain tasks related to the execution of the Program.

-establish an interagency committee with representatives from all concerned agencies and hold periodic meetings for the development and implementation of the WHPP. This committee will also be responsible for performing progress evaluations of the implementation of the Program.

-locate and maintain an updated inventory of all public supply wells and delineated wellhead protection areas (WHPA's) on topograhpic quadrangles with a scale of 1:20,000.

-implement contamination control mechanisms or reinforce existing ones within WHPA's.

-establish controls in existing EQB Regulations, including pertinent amendments, in order to comply with the goals of the Program.

-submit comments, with the purpose of amending Regulations of the PRPB and PRA, in order to include further management approaches within WHPA's within the legal scope of these agencies.

-continue the location, identification and update of potential pollution source inventories for WHPA's on overlays for maps of a scale of 1:20,000.

2. **Puerto Rico Department of Health (DOH)**

The DOH was established through the Health Service Reorganization Law (Law No. 81 of March 14, 1912, as amended). This agency is responsible for the protection of health and welfare of the complete Island population. The DOH administrates and inforces Public Drinking Water Systems under the Safe Drinking Water Act (PL 93-523) which was promulgated to ensure that potable water supplies of the Island will not cause adverse health effects. The Law for the Protection of Drinking Water Quality (Law No. 5 of July 21, 1977) grants the DOH the responsibility of the protection of drinking water quality and the establisment of drinking water standards. Furthermore, the DOH performs inspections and monitors all public water supply systems in Puerto Rico, including those operated by PRASA. In addition, the DOH endorses a new drinking water system, once it has verified the water quality and also prevents diseases which may be caused by contaminated water.

Within the WHPP, the DOH will carry out the tasks already mentioned. This Departament will also collaborate with PRASA and DNR in the development and implementation of the Contingency Plan which will be activated in any emergency situation in which groundwater resources prove to be effected by contaminants, thus causing adverse human effects.

3. **Puerto Rico Aqueduct and Sewer Authority (PRASA)**

This agency was created by the Puerto Rico Aqueduct and Sewer Authority Law (Law No. 163 of May 3, 1949). The Authority is responsible of providing adequate drinking water and other related services. Furthermore, PRASA is in charge of planning, designing and constructing drinking water filtration plants, aqueducts, and sewer systems which serve residential, industrial and commercial areas. The Authority is also is in charge of the operation and maintenance of these facilities.

PRASA's participation in the WHPP will consist of the duties already mentioned, in addition to the development and implementation of the Contingency Plan required as part of the Program. The Authority will maintain a well register which includes information such as name, coordinates, system identification, use, depth, status of operation, and production or pumping rate. This information will be periodically transferred to EQB, so that in turn, the Board can enter this information into the groundwater data banks.

Furthermore, it will be responsibility of PRASA to include in their planning process of the development of new wells, to consider all potential pollution sources adjacent to or within posible wellhead protection areas.

4. Puerto Rico Planning Board (PRPB)

This agency was created by the Organic Law of the Puerto Rico Planning Board (Law No. 75 of June 24, 1975) with the purpose of directing the integral development of Puerto Rico, according to current and future social, environmental, physical and economical needs. This law was enacted with the objective of promoting the current and future welfare of the Island's population in the development process. In order to carry out this objetive, the PRPB peforms the following tasks:

-directs the application of the established economic, social and physical public policies that serve as references and guides to governmental action.

-carries out the planning process for land use that includes the analysis, formulation and implementation of public policies, objectives and plans that guarantee the optimal use of land for different purposes.

As part of the WHPP, the Planning Board will consider amendments to the Zoning Regulation for Puerto Rico (Regulation #4 of the PRPB). These amendments will be directed to the possible prohibition of new sources of contamination within wellhead protection areas. EQB will make recommendations to the PRPB as to the possible amendments to be considered to comply with the Program.

5. Regulations and Permits Administration (RPA)

The RPA was created by the Organic Law for the Administration of Regulations and Permits (Law No. 76 of June 24, 1975, as amended). This agency is responsible for inforcing regulations approved and promulgated by the Puerto Rico Planning Board, administrate the necessary permits for regulated activities, and issue construction and use permits for specific structures, in accordance to present zoning.

Under the WHPP, the RPA will consider amendments to the Construction Regulation for Puerto Rico (Regulation No. 7), among others, with the purpose of protecting the recharge area of artesian or deep wells, and the wellhead areas of phreatic or shallow wells, which can allow the inclusion of mechanisms for the protection of groundwaters. EQB will also make recommendations to RPA as to the possible amendments to be considered to comply with the Program. It will be responsibility of the RPA to enforce any amendment made to their Regulations which will support the WHPP.

6. Department of Natural Resources (DNR)

The DNR was established by the Organic Law of the Department of Natural Resources (Law No. 23 of June 20, 1972). This agency is responsible of inforcing those programs directed to the utilization and conservation of the natural resources of Puerto Rico. Furthermore, the Puerto Rico Water Law (Law 136 of June 3rd, 1976) grants the DNR the responsibility of planning future uses for Island waters, and the administration and custody of water resources which have been declared a national patrimony. Other tasks related to the conservation of waters which have been delegated to DNR are:

-establish permit and franchise systems for the use of Island waters;

-regulate the design, construction, operation, use and closing of water wells;

-perform inventories and maintain well registers;

-declare emergency situations of water supplies;

-substitute water supplies which may present problems;

-establish and manage water areas in critical state;.

-establish a classification system for water resources.

In accordance to the duties and responsibilities assigned to the DNR, as part of the WHPP, this agency will continue to maintain a register of every existing and new well. This register will include name, location and information related to well permits and franchises. This register should be accesible to other concerned agencies.

In addition, DNR will consult EQB when evaluating a permit or franchise for a well, so that EQB can identify any potential pollution source that could affect the water quality of the well. Furthermore, this agency will help, in the development of the Contingency Plan, specifically in that related to the establishment of alternate wells in areas highly susceptible to water shortages or contamination.

7. Puerto Rico Department of Agriculture (PRDA)

This Department was established by the Jones Law of March 2, 1917, and was originally known as the Department of Agriculture and Labor. Subsequent amendments to the law, specifically Law No. 132 of July 17, 1960, have designated the Department as it currently stands. The principal objective of this Department is to improve the conditions and quality of living in the rural zones of Puerto Rico, thus helping in the development of agricultural and livestock activities in these areas.

This Department currently enforces Laws and Regualtions for the use of pesticides and fertilizers. Under the WHPP, the PRDA will continue these tasks for more strict enforcement of these substances within wellhead protection areas.

8. **Agricultural Extension Service (AES)**

This is an educational entity of the University of Puerto Rico. Their current functions, among others, are to educate farmers in the application and use of pesticides and fertilizers with the sole purpose of worker protection. Within the WHPP, the Environmental Quality Board will help the AES in the education of farmers to protect groundwater resources, specifically in wellhead protection areas.

B. Federal Agencies

In Puerto Rico there are two (2) federal agencies with fundamental responsibilities related to the protection of groundwaters on the Island. These are the Environmental Protection Agency and the United States Geological Survey.

1. Environmental Protection Agency (EPA)

The Reorganization Plan No. 3 of December 2, 1970 created this agency. This plan consisted in grouping different offices that performed related duties that dealt with the protection and development of the environment.

This agency is responsible for the administration of federal laws related to the protection of the environment and public health. Among the laws administered by EPA for these purposes are: the Clean Water Act (CWA), Safe Drinking Water Act (SDWA), Resource Conservation and Recovery Act (RCRA), Comprehensive Emergency Response, Compensation and Liability Act (CERCLA), Federal Insecticide, Fungicide and Rodenticide

Act (FIFRA), and Toxic Substance Control Act (TSCA). EPA also supervises state agencies which have been delegated the execution of federal laws.

As part of the Wellhead Protection Program, EPA will continue with current tasks, but will also evaluate the development and implementation of the Program. EPA will also make funds available through Section 106 of the Clean Water Act for the implementation of part or all of this Program. It will be responsibility of EQB to request funds under this Section to implement the Program, taking into consideration the priorities of the Groundwater Program currently inplace.

2. United States Geological Survey (USGS)

The USGS was created by Law No. 43-USC-31 (Geological Survey Organic Act of May 3, 1879). This agency is in charge of preparing topographic and geological studies, and carries out investigations related to mineral and water resources. The Water Resources Division of the USGS is in charge of investigations related to groundwaters. As part of these investigations the USGS in Puerto Rico performs the following:

-well inventories;

-investigates saltwater intrusion problems;

-studies related to groundwater quality and quantity;

-delineates aquifer boundaries;

-characterizes Island aquifers;

For the development of the WHPP, the USGS will perform the task of delineating wellhead protection areas (WHPA's). The delineation method will depend on the hydrogeological characteristics of each Island aquifer. As a long-term goal, the USGS will include all potential contamination sources in a GIS format. EQB will supply the Survey with this information.

3. United States Department of Defense

The Puerto Rico Federal Relations Act of March 2, 1917, Title 48, Section 731 of the U.S.C. authorized the installation of Military Bases in Puerto Rico. Military Bases in Puerto Rico which have public supply water wells are:

Fort Buchanan Military Reservation
Roosevelt Roads Naval Reservation
Ramey Air Force Base
Fort Allen Naval Radio Station
Camp Santiago Army Training Site
Sabana Seca Naval Base

For the implementation of the WHPP, these bases will locate all drinking water wells within their jurisdiction and any potential contamination source which may affect them. This information will be forwarded to EQB.

C. Program Coordination

The Environmental Quality Board will have the central coordination role in the Wellhead Protection Program. Wellhead protection activities of the Environmental Protection

Agency within the Commonwealth of Puerto Rico will be coordinated through EQB.

EQB interaction with other Commonwealth and Federal agencies will be coordinated through the Board's Groundwater Project unit, of the Water Quality Area, and will rely on existing agency structure and mechanisms. The existing institutional structure of the Commonwealth of Puerto Rico allows for the implementation of many of the activities required by the Wellhead Protection Program. However, many Regulations inplace will have to be amended to provide legal strength for adequate enforcement of the Program and adequate wellhead protection.

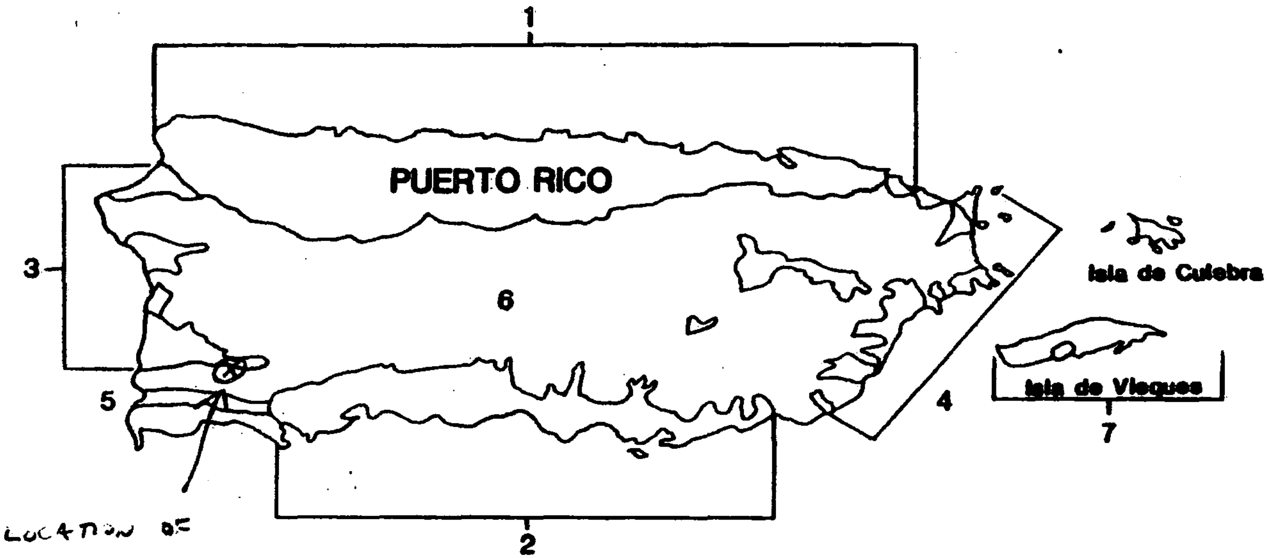
In order to strengthen institutional structures, EQB will develop Memorandums of Agreement (MOA's) which will specify the roles and duties of the agencies outlined in this Chapter. The MOA's, in conjunction with EQB's lead coordinating role for the WHPP, will prove to serve as a high level of wellhead and groundwater resource protection.

THIS PAGE WAS LEFT BLANK INTENTIONALLY

CHAPTER 3

THIS PAGE WAS LEFT BLANK INTENTIONALLY

THIS PAGE WAS LEFT BLANK INTENTIONALLY



Approximate location of San German Ground Water Contamination Site

EXPLANATION

1. North Coast Province
2. South Coast Province
3. West Coast Province
4. East Coast Province
5. Lajas Valley
6. Interior Province
7. Vieques, Culebra

Figure 1.--Ground-water provinces in Puerto Rico (Modified from Gomez-Gomez, 1987)

Chapter 3: Wellhead Protection Area Delineation

EQB, as lead agency is responsible for the development and implementation of the WHP Program, and will develop a method to delineate WHPA's for wells that are used as sources of drinking water. The Groundwater Pollution Control Project, under the Water Quality Area of EQB is currently developing a program for the protection of groundwater in Puerto Rico from contamination of different sources. This program has developed the "Groundwater Quality Management and Protection Strategy for Puerto Rico", with the supervision of EPA, and with the cooperation and assistance of other related state and federal agencies that deal with groundwater in Puerto Rico.

This strategy is aimed at establishing a coordinated effort for the protection of groundwater resources in Puerto Rico. Wellhead protection activities will be included as part of the tasks that EQB is developing in conjunction with this groundwater protection strategy for Puerto Rico. Given the fact that the EQB Groundwater Pollution Control Project has most of the information on wells and well contamination available through efforts initiated with the implementation of the groundwater protection strategy for Puerto Rico, EQB is in the position to initiate the establishment of WHP areas in Puerto Rico.

WHPA's delineation in Puerto Rico will be established by EQB taking into consideration the Island's limited territorial extension. Wells in Puerto Rico have been and are frequently located (1) near or within urban areas, (2) in densely populated rural communities or (3) near industrial facilities. A general delineation goal consisting of wellfield management areas, including large land portions, may prove to be impractical for Puerto Rico. Many of these urban, rural or industrial zones are already located in well recharge areas. Many contaminant attenuation zones around potable water wells in Puerto Rico may contain portions of residential or industrial zones that constitute potential sources of contamination for groundwater. Most of the largest urban communities and industrial facilities in Puerto Rico are located in coastal areas and alluvial plains, where most of the island's most productive aquifers are encountered. Therefore, the wellhead protection program needs to take into consideration the island's limited land availability and the increasing industrial and urban developments in aquifer-bearing areas in Puerto Rico when delineating the wellhead protection areas throughout the island.

The occurrence and distribution of water resources in Puerto Rico will play an important role in the delineation of wellhead protection areas in Puerto Rico. These delineations need to be developed according (1) to the hydrogeologic characteristics and (2) available information of the island's aquifers. For conveniences of the WHP program, the island's aquifers have been grouped into the following seven (7) ground-water provinces in Puerto Rico shown in Figure 1 and listed in Table 1:

1. North Coast Province
2. South Coast Province
3. West Coast Province
4. East Coast Province

5. Lajas Valley

6. Interior Province

7. Vieques and Culebra

The first task in the delineation of the wellhead protection areas in Puerto Rico will consist in the identification, location, and plotting of all the potable water wells on the island on topographic maps (scale 1:20,000), according to their geographic coordinates. For this purpose, EQB has been developing a well inventory and data base which also has formed part of the tasks included in the "Groundwater Quality Management and Protection Strategy". The USGS, Caribbean District in San Juan recently created the most complete computerized well inventory in Puerto Rico. EQB will use this inventory known as the Ground Water Site Inventory (GWSI), in conjunction with the Survey's GIS data-management program. Both serve as the basis to preliminarily identify and locate the wells that will be included in the WHPA's delineation process. Additional hydrologic and geographic well data will also be gathered from well records available at DNR, PRASA and EQB. Well data will include pumping rates, well depth, thickness of well screen, geologic information and water levels, if available.

Given the fact that wellhead protection area delineation is an evolutionary process, the delineation of WHPA's in Puerto Rico will be developed in two phases which are described below and summarized in Table 1:

Phase One: In phase one, a fixed radius of 1500 feet will be drawn around all potable water wells that have been plotted on

TABLE 1. Wellhead Protection Area (WHPA) subdivisions in Puerto Rico and corresponding delineation methods.

Groundwater province	Aquifer or area	Type of aquifer	WHPA delineation Phase I	WHPA delineation Phase II	Status of USGS numerical ground water flow model
North Coast...	San Juan	Leaky (alluvium limestone)	Distance (fixed radius 1500 feet)	Time-of-travel (analytical Approach #2)	Near Completion
	Vega Alta	Unconfined (alluvium lime-stone)	Distance (fixed radius)	Time-of-travel (analytical Approach #2)	Available
	Manati	Unconfined (alluvium lime-stone)	Distance (fixed radius)	Time-of-travel (analytical Approach #2)	Available Being Update
	Arecibo	Unconfined (alluvium lime-stone)	Distance (fixed radius)	Time-of-travel (analytical Approach #2)	In Progress
	Aguadilla	Unconfined (alluvium)	Distance (fixed radius)	Time-of-travel (analytical Approach #2)	In Progress
	Artesian aquifer	Confined	Aquifer boundary (recharge area delineation)	Aquifer boundary (recharge area delineation)	Near Completion
East Coast...	Fajardo	Unconfined (alluvium)	Distance (fixed radius	Time-of-travel (analytical Approach #1)	None
	Naguabo-Humacao	Unconfined (alluvium)	Distance (fixed radius	Time-of-travel (analytical Approach #2)	Available
	Yabucoa	Unconfined (alluvium)	Distance (fixed radius	Time-of-travel (analytical Approach #2)	None
	Maunabo	Unconfined (alluvium)	Distance (fixed radius	Distance (calcu-lated radius Approach #1)	None

TABLE 1(cont.) Wellhead Protection Area (WHPA) subdivisions in Puerto Rico and corresponding delineation methods.

Groundwater province	Aquifer or area	Type of aquifer	WHPA delineation Phase I	WHPA delineation Phase II	Status of USGS numerical ground water flow model
South Coast...	Patillas to Ponce	Unconfined confined (alluvial fan limestone)	Distance (fixed radius)	Time-of-travel (analytical Approach #2)	Near Completion
	Tallaboa-Guayanilla	Unconfined (alluvium limestone)	Distance (fixed radius)	Distance (calculated radius Approach #1)	None
	Yauco-Guánica	Unconfined (alluvium)	Distance (fixed radius)	Time-of-travel (analytical Approach #2)	Available
Lajas Valley...	Lajas Valley	Unconfined confined (alluvial fan limestone)	Distance (fixed radius)	Time-of-travel (analytical Approach #2)	None
West Coast...	Río Guanajibo valley	Unconfined (alluvium limestone)	Distance (fixed radius)	Time-of-travel (analytical Approach #2)	None
	Río Yaguez valley	Unconfined (alluvium limestone)	Distance (fixed radius)	Distance (calculated radius Approach #1)	None
	Río Grande de Añasco valley	Unconfined (alluvium limestone)	Distance (fixed radius)	Time-of-travel (analytical Approach #2)	None
Vieques and Culebra	Vieques	Unconfined (alluvium)	Distance (fixed radius)	Time-of-travel (analytical Approach #2)	None
	Culebra	Unconfined (alluvium)	Distance (fixed radius)	Time-of-travel (analytical Approach #2)	Available

TABLE 1(cont.) Wellhead Protection Area (WHPA) subdivisions in Puerto Rico and corresponding delineation methods.

Groundwater province	Aquifer or area	Type of aquifer	WHPA delineation Phase I	WHPA delineation Phase II	Status of USGS numerical ground water flow model
Interior...	Caguas-Juncos valley	Unconfined (alluvium)	Distance (fixed radius)	Time-of-travel (analytical Approach #2)	In Progress
	Cayey valley	Unconfined (alluvium)	Distance (fixed radius)	Distance (calculated radius Approach #1)	None
	Bedrock	Unconfined (bedrock)	Distance (fixed radius)	Distance (calculated radius Approach #1)	None

1:20,000 scale maps through the use of the U.S.Geological Survey's GWSI and GIS data management programs. These fixed-radius maps will be provided to EQB by the USGS during Fiscal Year 1991. The fixed-radius criteria will not be used, however, in wells tapping the North Coast artesian limestone aquifer. The aquifer-boundary criteria will be used to delineate WHPA for wells tapping this artesian system. This will consist on delineating the artesian aquifer recharge area based on hydrogeological mapping.

Phase Two: In phase two, wells tapping aquifers located within the ground-water provinces shown in Figure 1 and listed in Table 1 will be analyzed - on a case by case basis - to redefine their wellhead protection areas. As described in Table 1, some protection areas will be delineated using the time-of-travel criteria, others will be delineated with analytical calculations (Figure 2), and finally ground-water flow models could be utilized, if scale permits, in those areas where the USGS already has built these numerical models. Areas in Puerto Rico where ground-water flow models have been constructed are listed in the last column of Table 1.

Prioritization for the delineation of wellhead protection areas in Puerto Rico will probably take into consideration the pumping rates of the island's potable water wells during phase two described above. In phase one, however, the use of the USGS/GWSI-GIS data management banks might preclude the need of establishing

THIS PAGE WAS LEFT BLANK INTENTIONALLY

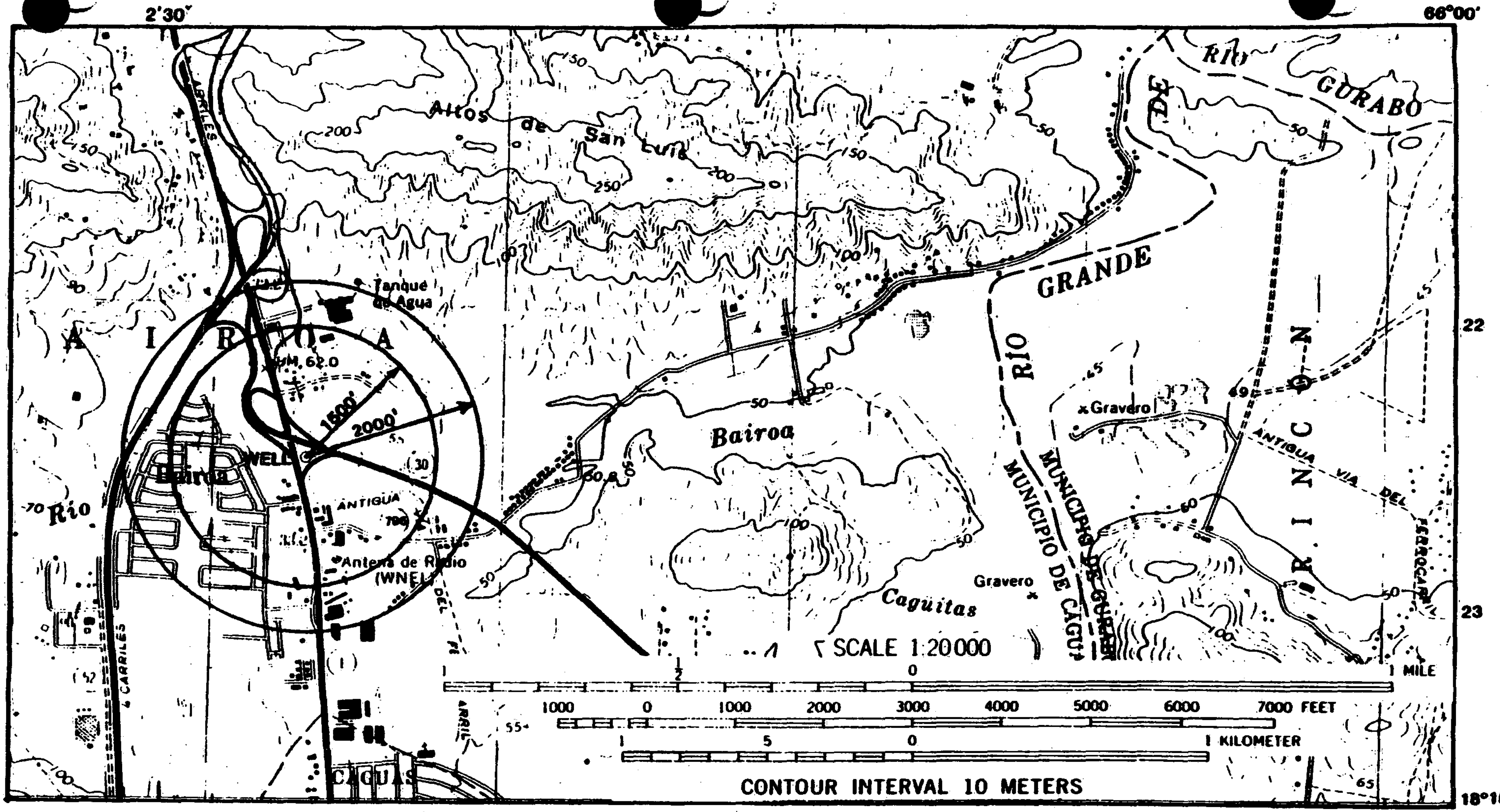


Figure 2. - WHPA delineation near Caguas comparing a fixed radius of 1,500 feet (Phase I); an analytical calculation based on the volumetric flow equation (Phase II, Approach #1) of 1,495 feet (≈1,500 feet); and an analytical calculation based on the Darcian velocity formula (Phase II, Approach #2) of 2,000 feet. Data used for calculations: pumping rate (Q) of 200 gallons per minute; time of travel of 5 years; length of well screen of 100 feet; aquifer porosity of 0.1; hydraulic conductivity of 23 feet per day; and a hydraulic gradient of 0.0048 ft/ft.

THIS PAGE WAS LEFT BLANK INTENTIONALLY

this kind of priority because all wells will be treated equally and because fixed-radius protection areas for all potable wells in Puerto Rico could be drawn quickly with these powerful computer-related tools. During the second phase of the delineation process, wells with greater pumping rates and those that serve greater populations, would probably be delineated first. Wells with pumping rates equal or greater than 1000 gallons per minute (gpm) will be given first priority. Wells with pumping rates between 500 and 1000 gpm will get the second priority, wells pumping at a rate of 100 to 500 gpm will get third priority, and finally those wells with pumping rates of less than 100 gpm will be given last priority. In cases where wells with pumping rates of less than 100 gpm constitute the only source of water for a community, these will get a higher priority. Phase one of the delineation process will begin during the third quarter of FY91 and will continue until all public potable water well protection areas are delineated.

In phase two of the delineation process, two approaches under the analytical method will be used to delineate WHPA's, depending on the data available and the degree of protection delivered by each approach. If a well has enough data available for delineation approaches 1 and 2, the approach that gives greater protection will be used; and if data is available for only one approach, the delineation will be carried out using that approach. Finally, if a well has no data available for either of the approaches, a WHPA will be delineated using the minimum criteria of both delineation approaches, that is a circular area with a radius of 1500 ft around the well. The numerical model method could be utilized in phase two if scales of the USGS models are appropriate.

During phase two of the delineation process, new wellhead protection areas delineated with the approaches described above, will be plotted on the corresponding 1:20,000 scale maps previously prepared during phase one of the delineation process. A complete set of the 67 topographic quadrangles that comprise the entire surface area of Puerto Rico will be kept in EQB files under the WHP program. EQB will be in constant communication with the USGS, DNR and PRASA, in order to keep track of new wells drilled, wells inactivated, or changes in well capacity in order to modify delineation areas accordingly.

EQB considers that these delineation criteria are not final, and are subject to modifications at any time. During the development and implementation phases of the WHP Program, EQB will continue its evaluation of other methods or criteria for delineation of WHPA's such as delineation methods based on drawdown criteria. If another method or methods for delineation prove to be more suitable for WHPA's delineation, or if more hydrologic data or research becomes available, EQB will reevaluate its delineation criteria. If WHPA's turn out to be too large, too small or improperly defined, new delineations will be carried out for those wells in need of additional or reduced protection.

A. **Analytical Delineation Method - Approach #1**

To delimit WHPA's around potable water wells, EQB will use the following criteria:

1. Circular areas around each potable water well, where the radius of these areas will be calculated using the volumetric flow equation:

   $r = (Qt/ònH)^{1/2}$

   where,

   r = WHPA radius, in feet

   Q = pumping rate of the well, in ft^3/yr

   t = travel time to well (5 years)

   H = length of well screen (in feet)

   n = aquifer porosity

   ò = constant = 3.14

2. If the formula gives a value greater than 1500 ft., the radius (r) will be rounded off to the nearest hundredth. If the radius (r) gives a value less than 1500 ft., a maximum radius of 1500 ft. will be used.

3. If the circular areas of two or more wells overlap, the smallest circular area that includes the total area delimited for each individual well will be outlined.

4. In cases where well data are not available, a minimum radius of 1500 ft will be used.

B. Analytical Delineation Method - Approach # 2

To delimit WHPA's around potable water wells, EQB will also use a criteria based on the time of travel (TOT) of groundwater (considering advection only), using the Darcian velocity formula:

$$v = Ki/n$$

where,

v = Darcian velocity of groundwater flow, in ft/day

K = hydraulic conductivity of the geologic material in ft/d

i = hydraulic gradient

n = porosity

1. K may be known, based on results of aquifer tests, or estimated, depending on the geologic material of the area.
2. Using the formula: distance = velocity x time, the distance traveled in five (5) years will be calculated and delineated around each well. The velocity is assumed to be uniform around each well. A circular area will be delimited around each well, so that a distance equivalent to a time of travel of groundwater of 5 years will be protected. However, areas may not be circular if gradients are not uniform or K is not uniform.
3. If the circular areas of two or more wells overlap, the smallest circular area that includes the total area delimited for each individual well will be outlined.
4. In cases where well data are not available, a minimum radius of 1500 ft. will be used for the WHPA.

C. Numerical Model Delineation Method

Ground-water flow numerical models developed by the USGS could be used to delineate WHPA's in Puerto Rico. Depending on the model and their scale, this method could be the most accurate and advantageous for the WHP program. Nevertheless, flow models are not available for all aquifers in Puerto Rico. This methodology, if used, will be incorporated into the WHP program later in the final stages of phase two.

THIS PAGE WAS LEFT BLANK INTENTIONALLY

CHAPTER 4

THIS PAGE WAS LEFT BLANK INTENTIONALLY

Chapter 4: Pollution Source Identification

According to the Safe Drinking Water Act, potential pollution sources include all those anthropogenic sources, point or nonpoint, in which contaminants are manufactured, used, stored, managed, transported or disposed which may have an adverse effect on human health. Some activities may be considered potential pollution sources since they can increase the aquifer vulnerability to contamination.

The Environmental Quality Board has developed a policy directed towards the protection of groundwaters which culminated in the approval by EPA of a "Groundwater Management and Protection Strategy" on October 13, 1988. Within the conceptual framework of the Strategy, a priority system has been developed with the goal of identifying sources, activities and places with the potential of contaminating groundwaters.

The established priorities are based on the importance of each source, activity or place. The implied importance was determined by taking into consideration the type of contaminants that can be introduced into the aquifer (transmissivity in water, documented impacts on drinking water quality, toxicology), the quantity of contaminants present at the source, and the potential of the source to bring about water quality degradation and cause an adverse effect on public water supplies.

Potential pollution sources may be classified in many different ways. The United States Office of Technology Assitance (OTA) developed a comprehensive listing of potential contamination sources in October 1984, which was reproduced by EPA in their "Guidance for Applicants for State Wellhead Protection Program Assistance Funds Under the Safe Drinking Water Act, June 1987". This list classifies potential pollution sources in six (6) categories and 33 types.

The fundamental need of protecting groundwaters as drinking water sources have lead EQB to gather information concerning potential pollution sources which can be used by different programs and agencies for remediation, assessment and planning purposes. EQB believes that the list developed by the OTA is a helpful structure to determine which are the potential contamination sources or activities in Puerto Rico. However, not all those activities included on the list are given in Puerto Rico. In order to verify the list and obtain a reliable source inventory which could impact WHPA's, EQB consulted various areas within the agency, in addition to a bibliographical revision of documents from other state and Federal agencies.

As a long-term goal, the Board will try to use a geographic information system (GIS) to identify all potential pollution sources of the inventory and immediately relate them to wellhead protection areas. This coordination will be made with the USGS.

A. **Priority List of Potential Pollution Sources Within WHPA's**

Potential pollution sources were assigned priorities taking into consideration the degree of risk that these presented to aquifers used as sources of drinking water. It should be noted that the degree of risk will vary according to the hydrogeological background in which the source is found and the biochemical nature of the contaminants that could reach the aquifer. The following are potential pollution sources that have been identified in Puerto rico in order of relative priority:

1. **Superfund Sites and National Priority List (NPL) Candidates** - these sites have received the highest priority since groundwater contamination has been documented at these sites. Preliminary assessments have been made at all superfund sites and NPL candidates which include historical information related to the sites. Furthermore, contaminants on the sites have been characterized.

2. **Landfills (industrial, municipal or illegal dumpsites)** - many landfills in Puerto Rico represent a high contamination risk, either because of their location or poor maintenance and operation procedures. It has been determined that nearly 63% of all landfills in Puerto Rico are operated deficiently.

3. **Underground Storage Tanks (UST's)** - in Puerto Rico, approximately 6,516 UST's have been registered in Puerto Rico, with an average life of 17.2 years and an average capacity of 11,741 gallons. These tanks, including underground piping, are subject to structural flaws which

may be responsible of spills which are not detected immediately.

4. **Underground Injection Facilities (UIF's)** - these facilities constitute potential pollution sources since they can introduce contaminants directly to aquifers. This type of activity has been regulated by EQB since 1983 and allows the injection of sanitary effluents, stormwaters and treated wastewaters.

5. **Hazardous Wastes Disposal, Storage and Management Facilities** - these activities are regulated by RCRA, and the "Regulation for the Control of Hazardous and Non-Hazardous Solid Wastes," of EQB. Eventhough these are very strict laws and Regulations, these activities or facilities represent a high potential of contamination to groundwaters if inadequately performed, which is increased by the nature of the wastes.

6. **Toxic Substances Storage Facilities** - these structures or warehouses are regulated by SARA, but in Puerto Rico certain sites have been found not to be in compliance with legal requirements. Given the toxicity and risk that these stored substances represent to any body of water, these will be included in the inventory.

7. **Single Residence Septic Tanks** - these structures, although regulated by the Underground Injection Control Regulation of EQB, for residential purposes are exempt from complying with this Regulation. However, due to the lack of sewer systems, mostly because of the poor accesibility for their construction, many homes must rely on septic tanks for the disposal of wastewaters, which is equivalent to an increase in the density of these structures making them potential pollution sources. Many rural communities use this practice.

8. **Agricultural Crops and Horticultural Activities** - these activities represent a high contamination risk to groundwater due to the indiscriminate use of pesticides and fertilizers. These chemicals can cause adverse health effects if found in drinking water, and also can be precursors of other chemical compounds such as nitrates.

9. **Livestock Enterprises** - this is another potential contamination source that due to the abundance in Puerto Rico can represent serious contamination problems of fecal origin, moreover when some of the structures used in fecal waste management systems, such as oxidations ponds, are constructed in highly permeable soils. These enterprises can also be a sources of pesticides and fertilizers.

10. **Sanitary Sewer Systems** - these structures represent contamination risks to aquifers, since they are subject to ruptures and can contaminate groundwaters with sanitary wastewaters or industrial effluents.

11. **"Small Generators"** - under Federal statute, these facilities are defined as those businesses, activities or industries that produce or generate between 100 and 1000 kg/month of toxic or hazardous wastes. Among some of the facilities or activities in Puerto Rico that can be classified under this category are:

    -Mechanic workshops

    -Clinical laboratories

    -Slaughterhouses

    -Junkers

    -Golf courses

    -Funeral homes

    -Cementeries

    These activities can introduce contaminants into the aquifers and cause adverse health effects.

12. **Natural sources which could be aggravated by human activities (salt water intrusion)** - overpumping and the absence of adequate recharge rates during droughts affect the equilibrium of the interface between fresh and saltwater near the coast, increasing saltwater intrusion

inland. This effects the availability of the resource as drinking water.

If any other source or activity which may represent an adverse impact over groundwaters is identified, it will be evaluated and included in this list if deemed necessary.

B. Procedures for Performing the Potential Pollution Source Inventory

1. All potential pollution sources will be identified manually, on overlays for topographic quadrangles of a scale of 1:20,000, in relation to wellhead protection areas (1,500-foot radius), in accordance to the delineation time frame. This will be done in the first year of implementation of the Program.

   Many of these sources have been inventoried in Puerto Rico and the EQB has gathered much of this information. Among the areas of EQB from which this information has been obtained or will be obtained are the:

   -Underground Injection Control (UIC) Program
   -Permits and Engineering Division
   -Underground Storage Tanks (UST) Control Program
   -Superfund Program
   -Erosion and Sedimentation Control Program
   -Non-Hazardous Waste Control Bureau
   -Hazardous Waste Control Bureau

-Small Generators Section

-Scientific Assessment Area

Other Commonwealth and Federal agencies which provide useful information to complete this inventory include, but are not limited to:

-United States Geological Survey

-Soil Conservation Service

-Environmental Protection Agency

-U. S. Department of Defense

-Department of Natural Resources

-Puerto Rico Planning Board

-Solid Wastes Management Authority

-Puerto Rico Aqueduct and Sewer Authority

-Regulations and Permits Administration

The necessary interagency coordination will be established to obtain the pertinent information to complete the inventory. MOA's may be used for this purpose when deemed necessary.

Information may also be obtained directly from the private sector, such as industries and consultants. It is important to point out that the inventory of potential pollution sources will include areas not designated as WHPA's, due to the general data obtained. However, this is a benefit to the Program since it will allow for rapid identification of pollution sources within new WHPA's.

2. Each identified source will be located on the overlays according to coordinates, when possible, or by their physical address. These overlays will be available after the first year of implementation of the Program.

3. Field visits will be performed to confirm or revise the information obtained, when necessary, and compensate any error in the inventory. This inventory may also be revised with the use of aerial photographs where possible and for those sources which may be recognized through photogrammetry. Field visits will be scheduled on a routine basis after the first year of implementation of the Program, or when human resources are made available.

4. As a long-term goal, this inventory will be stored and updated through the USGS Geographic Information System (GIS).

C. Procedures for Refining, Expanding and Updating the Inventory

The identification of potential pollution sources within wellhead protection areas is a dynamic process which requires the continuous evaluation of available information. The main goal of this inventory is to support the planning needs of any program aimed at the protection of groundwaters.

1. Refining the Inventory

The current inventory includes all those potential contamination sources from which necessary information has been obtained, allowing for the location of these sources on topographic quadrangles. This information will be refined taking into consideration the established priorities for the identification of pollution sources. Established priorities considered vulnerability of the aquifer to contamination and the nature of the contaminants which could be generated at each source.

Furthermore, once the GIS is fully implementable, this will help refine the exact location of potential contamination sources given the accuracy of these systems. Meanwhile, the inventory will be available on acetate or mylar overlays, together with relevant information of each source in a worksheet designed using Lotus 1-2-3.

2. **Expanding and Updating Inventory**

-New information will be added to the inventory using the administrative procedures inplace by EQB, or through MOA's as previously indicated. For example, information will be updated in accordance to the renewal of UIC permits or UST notifications, to include the new information received.

-Coordinate with those agencies that regulate activities which represent contamination potential, specifically within WHPA's, so that they can periodically provide EQB with a list of the persons or the locations where these activities are carried out.

-Include potential contamination sources within the previously defined categories through the evaluation of environmental impact statements performed by EQB. These evaluations are performed to comply with Article 4(C) of the Environmental Public Policy Law of EQB.

-Include in the inventory those new categories of potential contamination sources which could arise in accordance with the development of Commonwealth and Federal Statutes.

The development and maintenance of a potential pollution sources inventory is responsibility of the Environmental Quality Board. Currently, personnel from the Groundwater Protection Project of the Water Quality Area of EQB coordinate the procedures to obtain this information, locate sources on topographic quadrangules, and the evaluation of any information which could modify the inventory. Once the Program is implementable, this working unit will continue with the updating and refinement of the inventory.

Expansion and updating of the inventory will be performed on a routine basis after the first year of implementation of the Program.

THIS PAGE WAS LEFT BLANK INTENTIONALLY

CHAPTER 5

THIS PAGE WAS LEFT BLANK INTENTIONALLY

Chapter 5: Management Approaches

Various Commonwealth and Federal agencies currently implement management programs for pollution sources in Puerto Rico. The complete identification and evaluation of these programs is broader than any individual task required by this Program. Therefore, existing control programs for each source identified in Chapter 4 will be briefly discussed which will be used in the implementation of the Program in addition to the necessary mechanisms required to achieve the goal of the WHP Program.

A. Superfund Sites and National Priority List Candidates

The U.S. Congress enacted the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act, also known as Superfund. The purpose of the Superfund Amendments and Reauthorization Act is to develop a comprehensive progam to set priorities for cleaning up the worst existing hazardous waste facilities or sites. After a thorough evaluation by the U.S. Environmental Protection Agency, the sites are placed on the National Priority List and are designated as Superfund Sites.

The U.S. Environmental Protection Agency has delegated implementation of the Pre-Remedial portion of the Superfund Amendments and Reauthorization Act to the Environmental Quality Board. The Pre-Remedial portion or the program consists of two phases. In the first phase, a Preliminary Assessment is conducted at a site that is suspected to pose a threat to the public and the environment. The Preliminary Assessment consists of, among other things, obtaining hydrogeological information on the site and inventory wells within a four-mile radius of the site.

In the second phase, a Site Inspection is performed. Surface water, groundwater and soil samples from the site are obtained to evaluate the relative threat associated with actual or potential releases of hazardous substances at sites using a scoring system known as the Hazard Ranking System.

The Hazard Ranking System is a mathematical model used by the U.S. Environmental Protection Agency to evaluate the relative potenttial of a site to cause human health, safety problems, ecological or environmental damage. Uniform application of this mathematical model in each state will permit the U.S. Environmental Protection Agency to identify those sites that pose the greatest hazard to human health or the environment.

The Hazard Ranking System assigns 20 points to sites within one-fourth (1/4) of a mile from a well and 5 points to sites within on-fourth to four (4) miles from a well. These values are incorporated into the mathematical model. If the site scores high enough (a minimum of 28.5 points) it is proposed for inclusion on the National Priority List. The Environmental Quality Board will start performing Site Inspections in March, 1991 as part its Superfund obligations.

As part of the management of these sites, the necessary mechanisms will be developed so that the Department of Natural Resources (DNR) will not permit the development of new wells at less than 1,500 feet of a superfund site. This mechanism is further detailed in Chapter 7. Also, the procedures will be initiated so that the mathematical model used for scoring National Priority List candidates within a defined WHPA can receive additional points.

B. Landfills (Municipal, Industrial and Illegal Dumpsites)

Some of the objectives of the Resource Conservation and Recovery Act (RCRA) is to prohibit dumps that do not use sanitary landfills, regulate the management and use of sanitary landfills, promote recycling, provide guidelines for the management of solid wastes, and promote recovery and conservation of natural resources. Furthermore, RCRA regulates the management of hazardous waste from the generator to storage or disposal of these wastes.

The Soil Contamination Control Area of EQB issues permits for the disposal of hazardous and non-hazardous wastes. The location, design, construction and operation of sanitary landfills should take into consideration the applicable standards and requirements of surface and groundwaters issued by EQB and EPA.

To issue these permits, the Board requires a soil and groundwater study, and the preparation of an Environmental Impact Statement (EIS) after the endorsement of agencies such as the Solid Wastes Management Authority, the DNR and the Puerto Rico Planning Board (PRPB). Furthermore, an Operation Plan for Emergency Situations and public hearings are required. The evaluation performed by EQB considers the relationship between the landfill and local aquifers, the maximum elevation of the groundwater table, the infiltration rate and the erosion of the topsoil.

The "Regulation for the Control of Hazardous and Non-Hazardous

Solid Wastes" of EQB regulates the management and disposal of hazardous wastes and subtances in accordance to RCRA requirements. This Regulation is currently being amended to require the development of monitoring wells at every new or existing landfill. Groundwater samples will be taken at these wells for chemical analyses to determine if lixiviates are affecting groundwaters.

Rule 304 of this Regulation entitled "General Prohibitions for Solid Wastes Facilities", establishes prohibitions for the location of these facilities in specific areas, such as floodable areas, and the prohibition of these facilities if they cause adverse effects on public health, endangered species, or if they contaminate surface or marine waters.

As part of the Implementation procedures of the WHPP, amendments to this Rule will be made to prohibit the establishment of facilities for the disposal of hazardous and non-hazardous wastes within WHPA's.

C. Underground Storage Tanks (UST's)

The Underground Storage Tank Regulation was approved on November 7, 1990 and has been promulgated to ensure the protection of Puerto Rico's surface and groundwater resources, and of public health, safety, welfare and the overall environment, by means of an adequate control of underground storage tank systems.

This Regulation, effective December 14, 1990, regulates tanks used to store or contain regulated substances and ten (10) percent or more of their volumen (including underground piping) is under the soil surface. The regulated substances under this Regulation are all those defined by Section 101(14) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), except those regulated as hazardous wastes under Subtitle (C); and petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure.

The general requirements for all the systems covered by this Regulation are as follows:

1. Owners and operators of new and existing UST systems must provide a method, or combination of methods, of release detection that:
   a. Can detect a release from any portion of the tank and the connected underground piping that routinely contains products;
   b. Is installed, calibrated, operated, and maintained in accordance with the manufacturer's instructions, including routine maintenance and service checks for operability or running conditions; and
   c. Meets the performance requirements of the Underground Storage Tank Regulation with any performance claims and their manner of determination described in writing by the equipment manufacturer or installer. In addition, methods used after December 22, 1990, except for methods permanently installed prior to that date, must be capable of detecting the leak rate or quantity specified for that method and with a probability of detection of 0.95 and a probability of false alarm of 0.05.
2. When a release detection method operated in accordance with

the performance standards of the Regulation indicates a release may have ocurred, owners and operators must notify the Board.

3. Owners and operators of all UST systems must comply with the release detection requirements of this Regulation by the year listed in the following table:

TABLE 2
SCHEDULE FOR PHASE-IN OF RELEASE DETECTION

YEAR SYSTEM WAS INSTALLED	YEAR WHEN RELEASE DETECTION IS REQUIRED (BY DECEMBER 22, OF THE YEAR INDICATED)				
	1989	1990	1991	1992	1993
Before 1965 or date unknown	RD	P			
1965-1969		P\RD			
1970-1974		P	RD		
1975-1979		P		RD	
1980-1980		P			RD
New Tanks after December 22, 1988	Immediately upon installation				

P = Must begin release detection for all pressurized piping in accordance with Rule 401(B)(1).

RD= Must begin release detection for tanks and suction piping in accordance with Rule 402(A), Rule 402(B)(2), and Rule 403.

4. Any existing UST system that cannot apply a method of release detection that complies with the requirements of Part IV of the cited Regulation must complete the closure procedures in Part VII of the Regulation by the date on which release detection is required for a UST system in accordance with Table 2.

To further comply with the requirements of the WHP Program, EQB will amend the Underground Storage Tank Regulation to require inmmediate installation of release detection systems for UST's within WHPA's, including artesian aquifer recharge areas. Furtermore, secondary containment will be required for all existing UST's within WHPA's. EQB will propose amendments to the Zonification Regulation (Regulation No. 4 of the Planning Board) to prohibit the installation of new UST's within wellhead protection areas.

D. Underground Injection Facilities (UIF's)

The Underground Injection Control Program of EQB has the authority to control activities or facilities of underground injection that can contaminate or affect the quality of groundwaters in Puerto Rico through the issuance of permits and the corresponding enforcement. This program will soon be completed delegated to the Environmental Quality Board.

Among the underground injection facilities and activities found on the Island are injection wells, septic tanks, sinkholes or natural drainage cavities and underground storage tanks. The latter were previously discussed in Section C of this Chapter.

With the goal of protecting the groundwaters of Puerto Rico from underground injection activities, EQB approved the "Underground Injection Control Regulation", on Septebmer 14, 1983, based on Federal statutes of the Safe Drinking Water Act. This Regulation regulates permissible injection activities and facilities which are subject to various dispositions and specifications, and prohibits some injection activities. The types of underground injection activities covered by this Regulation include:

1. Any UIF located over a perforation platform within territorial waters of Puerto Rico.
2. Any UIF, irrespectively of the groundwater quality.
3. Any well in which the principle function of the well is for the deposit or underground disposal of fluids.
4. Any septic tank or well, with perforated bottom or sides, used as hazardous wastes management facilities for the disposal of fluids which contain hazardous wastes.
5. Any septic tank or well, with an open bottom and sometimes perforated sides, or other wells used by multiple houses, industries, or other establishments.
6. Any sinkhole or natural drainage cavity used for the deposit or injection of fluids.
7. Private or governmental injection facilities, including municipal, Commonwealth and Federal facilities.

The Environmental Quality Board issues permits to UIF's according to various criteria such as:

1. The injection of fluids will not result in migration to an underground drinking water source, except in the case of stormwaters, cooling waters, or treated wastewaters which comply with standards for "SD" waters (surface waters used as raw sources of drinking water supplies, propagation and preservation of desirable species, and for primary and secondary contact recreation) in

accordance to the Water Quality Standards Regulation of EQB.

2. Underground injection will not result in the presence of any contaminant at a drinking water source which could adversely affect human health or cause a violation to any primary drinking water standard.

3. The establishment of an adequate contingency plan to confront any malfunction of failure of the facilities to prevent migration of fluids to any groundwater drinking water source.

4. An endorsement of the Department of Natural Resources has been obtained prior to the approval of the Permit.

Notwithstanding any other disposition of the aforementioned Regulation, the Board may take any emergency action upon the receipt of information that a contaminant is present or may enter a public water supply system and present an imminent and substantial threat to human health.

Within the projections to implement the WHPP, amendments will be made to the "Underground Injection Control Regulation" so that the establishment of new UIF's will be prohibited within wellhead protection areas. Furthermore, any existing UIF within a wellhead protection area will be required to periodically monitor effluents or fluids injected to the ground.

Amendments will also be considered to this Regulation so that any injected fluid comply with the standards and uses for groundwaters recently adopted by the Water Quality Standards Regulation in July 1990.

E. <u>Hazardous Wastes Disposal, Storage and Management Facilities</u>

RCRA regulates the transportation, treatment, storage and disposal of hazardous wastes. Federal law defines a hazardous waste as one that because of the quantity, concentration or physical and chemical characteristics can contribute or cause an increase in mortality or an irreversible capacity. Furthermore, these wastes present hazards to the environment and human health when they are stored, treated or disposed of inadequately. One of the requirements for the management and disposal of these wastes is to obtain the corresponding permits from EPA, with the exception of the transportation permits which are issued by EQB.

Among other considerations, RCRA requires chemical and physical analyses of the wastes; the development of a contingency plan detailing measures to prevent events which may pose a threat to human health or the environment; the establishment of natural or artificial boundaries around storage facilities; warning signs and 24-hour supervision of entrance to facilities; training of personal for the management of wastes; and the development of a closure plan explaining measures to be taken to prevent that hazardous wastes affect human health or the environment after ceasing operations of the facility.

The "Regulation for the Control of Hazardous and Non-Hazardous Solid Wastes", of EQB includes specific dispositions for generators and transporters of hazardous wastes, special requirements for treatment storage and disposal facilities, establishes the requirements for transportation permits, and standards for the management of these wastes.

The Inspection, Surveillance and Monitoring Division of the Hazardous Waste Bureau of EQB performs inspections to incineration facilities and issues permits for the transportation of these wastes. Furthermore, the operators of waste storage facilities must inform the Division the names of the hazardous wastes, types of storage container and storage capacity of the facility.

In the implementation of the WHPP, the Environmental Protection Agency will consult EQB when evaluating construction and operation permit applications for hazardous waste storage facilities, since EQB is the agency which will have the location of drinking water wells and corresponding WHPA's, specifically to the groundwater Project personnel of the Water Quality Area.

F. Toxic Substances Storage Facilities

These structures are regulated by Title III of the Superfund Authorization and Recovery Act (SARA). Subtitle B of Title III of the Act requires that every owner of these facilities provide information annually relative to the types and location of toxic substances within their facilities on "Material Safety Data Sheets", "Chemical Inventory Forms", and "Toxic Release Forms". These substances are usually the industry's or facility's raw materials, not wastes.

EPA has delegated to EQB the responsibility of compiling the information submitted by the owner's of these facilities. This information includes the name and quantity of the substances, location of the storage facility, types of storage containers, hazardous category, emergency response plans, and list of personnel in charge of emergency response with names and telephone numbers.

This information is entered into a data base with the purpose of organizing and preparing emergency environmental response related to toxic substances spills.

Under the Wellhead Protection Program, EQB personnel in charge of environmental emergencies will check with the Groundwater Project Unit when an emergency situation at these facilities is detected, to verify if they are located within a WHPA. With this information, emergency response personnel of EQB will be able to take pertinent actions and decisions to protect groundwater resources.

Furthermore, to establish these facilities, the submittal of an Environmental Impact Statement (EIS) is required in accordance with Article 4(C) of Law No. 9. Therefore, in the evaluation process of the EIS for this pollution source category, personnel from the Groundwater Project Unit will determine if the establisment of these facilities is feasible within WHPA's.

G. Single Residence Septic Tanks

The impact of single residence septic tanks on groundwater quality in Puerto Rico is significant. The majority of the Island's rural communities use septic tanks as the final disposal method for sanitary wastewaters due to the lack of adequate sewer systems which are provided by PRASA.

In Federal statutes (Safe Drinking Water Act) there is no disposition which regulates the establishment and use of single residence septic tanks. In Commonwealth regulations (Underground

Injection Control Regulation), these facilities are exempt from complying with the provisions set forth in the Regulation.

The Wellhead Protection Program has the objective of establishing alternatives to regulate single residence septic tanks in communities within WHPA's. For existing communities within WHPA's, the coordination will be made with Municipal Governments and PRASA to assign a greater priority to these communities for the establishment of adequate sewer systems, if feasible.

For the establishment of new communities, EQB will coordinate with the Deparment of Rural Housing the endorsement of new developments with septic tanks, if these developments will be located within WHPA's, based on the quantity of contaminants that these communities could introduce into the aquifers.

H. Agricultural Crops and Horticultural Activities

Agricultural activities represent a contamination risk due to the indiscriminate use of fertilizers and pesticides. These chemicals are regulated by the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), as amended.

In Puerto Rico legislation has been passed to control the use of pesticides and fertilizers based on Federal law. The Pesticides Law of Puerto Rico (Law No. 49 of June 10, 1952) and Fertilizer Law (Law No. 19 of May 8, 1973) were promulgated with the objetive of regulating the use, selling, management and disposal of these chemicals. The Puerto Rico Department of Agriculture currently administrates these laws.

The Agrologic Laboratory of the Department of Agriculture maintains a register of pesticides used in Puerto Rico through the issuance of certificates for the use of fertilizers and pesticides. Pesticides which have been prohibited in the United States have also been banned in Puerto Rico. Furthermore, the Laboratory also supervises the way in which these chemicals are used and labeling compliance.

The Agricultural Extension Service administrates an educational program through which farmers are trained and licensed to apply pesticides with the purpose of worker protection.

EQB performs crop and pasture inspections in order to obtain information pertaining to farmer's personal data, type and size of the farm, type of conservation practices used, type and frequency of use of pesticides and fertilizers, and protection measures taken for waterbodies within the farmer's premises. With the information obtained, a detailed report is forwarded to the Agrologic Laboratory. Furthermore, EQB will develop an educational module to be included as part of the trainings currently performed by the Agricultural Extension Service. As part of this module, best management practices directed towards the protection of groundwater resources will be included, which are also applicable to the WHPP. Furthermore, coordination will be carried out with the Agrologic Laboratory to prohibit the use of persistent pesticides within WHPA's.

I. <u>Livestock Enterprises</u>

Groundwaters in Puerto Rico are also affected by livestock enterprises overlying aquifers or in adjacent areas to sinkholes or natural drainage cavities which are direct connections to groundwaters.

Under the Federal Clean Water Act of 1972, as amended, the Environmental Quality Board has gradually developed a Nonpoint Source Management Program on the Island in which livestock enterprises are included.

Currently, under this Program, two-year Compliance Certificates are issued for the operation of Animal Waste Management Systems. To control inadequate management of animal fecal wastes from livestock enterprises, coordination with other Commonwealth and Federal government agencies has been undertaken.

Also, a "Regulation for the Control of Animal Fecal Wastes Generated by Livestock Enterprises" is under development, aimed to regulate the construction and operation of animal waste management systems, taking into consideration specific measures for the protection of groundwaters.

Within the scope of WHPP, new livestock enterprises, which in turn is equivalent to an animal waste management system, will not be permitted within designated WHPA's. On the other hand, if livestock enterpises are already established within a WHPA, the construction of structures such as oxidation ponds will be required to be established at a minimum distance of 1,500 feet from sinkholes or other drainage cavities, to prevent the access of fecal wastes to groundwaters.

J. Sanitary Sewer Systems

The increasing population rate and the problems that are facing the existing wastewater treatment facilities, among other factors, make necessary the improvement, replacement, or construction of new systems.

the Federal Water Pollution Control Act established a broad national policy for restoration of the chemical, physical an biological integrity of our water resources towards a more adequate utilization for domestic, agricultural, industrial and recreational purpose. This Act has been amended on various occasions, with the last amendments in 1987. With the 1987 amendments the construction Grants Program (Title II) has been extended until FY 1990. Under this Title, funds are granted for the construction of wastewater treatment facilities. Also the State Water Pollution Control Revolving Fund (SRF) program, under Title VI, for the financing of water pollution control projects was created and authorized to be extended until FY 1994. Beginning in FY 1987, states would have the option to use a portion of their annual construction grants allotment for the capitalization of SRFs. Through Section 205(m) of the Act the states can transfer funds from Title II allotments to be used as SRF Capitalization grants. These federal funds will help the states to meet the enforcement requirements of the Act.

In Puerto Rico, the Environmental Quality Board (EQB) is the agency responsible for the development of a mechanism for determining the priority for construction of the wastewater collection, treatment and disposal projects. This mechanism has been established in the Priority System which has been developed to set priorities for the projects according to their capacity for reducing or eliminating pollution by wastewaters, as well as the need of said projects. The proposed projects are ranked to form the Priority List. The proposed projects will be certified based on the Priority System, position on the List and the availability of funds.

In the implementation of the WHPP, the section of the Priority System which refers to aquifers will be modified. In this section of the system, two (2) additional points will be awarded to communities within WHPA's. This will grant a higher priority to communities within WHPA's which lack sanitary sewer systems, thus probably causing contamination to adjacent wells due to inadequate disposal of sanitary wastewaters, or by the concentration of single residence septic tanks as discussed in Section G of this Chapter. Furthermore, coordination with PRASA will be made so that the development of new sewer systems within WHPA's can be avoided to the extent possible.

K. Small Generators

In the amendments made to RCRA in 1984, the United States Congress assigned EPA the responsibility of regulating small generators which produced between 100 to 1,000 Kg/month of hazardous wastes. Small generators include mechanic workshops, clinical laboratories, and printshops among others.

Federal regulations require that these facilities obtain an identification number given by EPA, management plan for the wastes to be transported, waste manifest, and maintenance of related files.

The EQB issues Operation Permits to biomedical wastes transporters, which are considered small generators, in accordance with EPA criteria. Furtermore, EQB currently has a Small Generators Section in which the following functions are performed:

1. Identification of small generators and inclusion in the Hazardous Wastes Data Management System.
2. Conduct orientation activities to small generators of hazardous wastes.
3. Provide technical assessment and evaluate documents related to small generators of hazardous wastes.
4. Perform complaint inspections to facilities classified as small generators and corresponding follow-up.
5. Perform corresponding monitoring activities to these facilities.
6. Prepare technical reports on investigations made to small generators.

Under the WHPP, these same tasks will be performed since the existing control mechanisms are directed to the protection of the environment in general, and cosequently groundwaters.

L. <u>Saltwater Intrusion</u>

The factors that most contribute to saltwater intrusion on the Island are overpumping from authorized extractions, and the absence of adequate recharge rates during prolonged droughts. The latter is specially evident on the southern coast of the Island.

When a saltwater introusion problem is evident, through notification of the Puerto Rico Aqueduct and Sewer Authority, the DOH, or the U.S. Geological Survey's saltwater monitoring network, it is the Department of Natural Resources (DNR) which will implement management approaches to reduce or alleviate the problem.

The first step taken by the DNR is to stop granting further franchises or water use rights in the area affected by saltwater intrusion. The DNR will continue to monitor the wells in the area to verify elimination of the situation. If the current condition worsens, then the DNR may declare a "Critical Area" under the provisions of Article 12 of the "Regulation for the Water Rights, Use, Conservation and Administration for the Waters of Puerto Rico", September 1984.

Once a critical area is declared by the Secretary of the DNR, special management approaches will be initiated to lessen the saltwater intrusion problem such as:

1. Modify extraction rates of wells with franchises in the affected area;
2. Suspend granting further franchises in the area; and, if necessary,
3. Revoke franchises granted for the use of groundwater.

All the management approaches detailed in this Chapter, as well as those proposed, will offer the necessary protection required for wellhead areas. In the annual progress reports, these mechanisms will be evaluated to determine which may need modifications, if any at all, for the adequate implementation of the Program.

THIS PAGE WAS LEFT BLANK INTENTIONALLY

CHAPTER 6

THIS PAGE WAS LEFT BLANK INTENTIONALLY

Chapter 6: Contingency Planning

A contingency plan must be structured in such a way as to provide rapid and effective solutions to problems that may arise from emergency situations of natural or anthropogenic nature, in which heatlh and human welfare may be threatened.

In accordance to the statutes of the Federal Safe Drinking Water Act, as amended (PL-93-523) pertaining to drinking water, a state which has primary enforcement responsibility for public water systems must adopt and implement and adequate plan for the provision of safe drinking water under emergency circumstances. In the Commonwealth, this responsiblity has been delegated to the Puerto Rico Department of Health (DOH). However, the Puerto Rico Aqueduct and Sewer System (PRASA) under Law No. 163 of May 3, 1949 is the only public purveyor of adequate drinking water. Private well systems used for drinking water are solely regulated by the DOH.

A. Emergency Planning Procedures

Under emergency circumstances, it is these two (2) agencies which, in conjuntion, must activate a contingency plan for public water supplies. In an emergency situation in which public drinking water supplies are affected, PRASA must detail the actions it will follow to remediate and supply alternate water sources to the public, under the strict supervision of the DOH. These two agencies have established the coordination mechanisms to promptly resolve any emergency situation. However, no formal contingency plan exists for the execution of these procedures.

PRASA and DOH, in conjuntion with the Environmental Quality Board, may determine that a critical area or an emergency situation exists. However, it is the Secretary of the Department of Natural Resources (DNR) which has the legal authority to declare a critical area, or recommended to the Governor of the Commonwealth to declare an emergency situation.

1. **Establishment and Management of Critical Areas**

Article 12 of the "Regulation for the Water Rights, Use, Conservation and Administration for the Waters of Puerto Rico" of the DNR states that "the objective of establishing a crital area is to make feasible the adoption of special standards and priority systems necessary to guarantee the best conservation, use and administration of the resources". A critical area according to Article 12.2b may be declared as such when the conditions of the water quality require special management to minimize damages to the resource, in order to protect the integrity of the sources administered in the activities of Franchises and Acquired Rights, or in favor of public interest.

Once a critical area is declared, the Secretary of the DNR will implement the following actions in accordance to Article 12.5 of the cited Regulation:

a. Establish priorities in the consumption of water which will be set for the administration of the Permit and Franchise systems;

b. Suspend the granting of new franchises or permits, if necessary, based on the evaluation of the hydrologic conditions;

c. Adopt a Water Supply Substitution Plan following the priorities established in incision a. above.

d. Require from some or all water users special extraction measures or water uses with the objective of conserving the resource, even when said measures were not required as part of an original Franchise or Acquired Right issued by the Department.

e. Require special reports from some or all users on the water rate and quantity extracted, the levels of surface or groundwaters, or any other information related to the condition of the resource, even when said reports were not required as part of an original Franchise or Acquired Right issued by the Department.

The establishment of a critical area is not subject to any specific time frame, but once declared as such by the Secretary of the DNR will remain in place until the state of the resource improves or when the current or expected use of the resource decreases in relation to the supply, eliminating the basis for the establishement of a critical area.

2. **Establishment of an Emergency Situation**

The Secretary of the DNR can recommend to the Governor of the Commonwealth of Puerto Rico that and Emergency Situation be declared, after a thorough consultation with the agencies and instrumentalities of the Commonwealth, when a water quality condition is foreseen or exists that can affect public health and welfare. This authority is granted to the Secretary in Article 13 of the "Regulation for the Water Rights, Use, Conservation and Administration for the Waters of Puerto Rico".

In accordance to Section 13.3 of the aforementioned Regulation, after an emergency situation is declared, the Secretary of the DNR can recommend to the Governor extreme water management and conservation measures such as, but not limited to:

a. Suspend granting new Permits or Franchises;
b. Leave without effect, total or partially, for a period not to exceed six (6) months, the Permits and Franchises in force and Acquired Rights.

The Emergency Situation will not exceed six (6) months, but may be extended six (6) additional months through a Governor's declaration to this effect if warranted.

Both of the previously described procedures are subject to the Public Hearing process, prior to the establishment of a Critical Area or the declaration of an Emergency Situatiton

B. Wellhead Protection Program Contigency Planning Requirements

Section 1428 (a)(5) of the SDWA requires that all WHPP Programs include a contingency plan "for the location and provision of alternate drinking water supplies for each public water system in the event of well or wellfield contamination." As stated in

Section A of this Chapter, PRASA, the principal water purveyor, and the DOH have established coordination mechanisms to promptly resolve any emergency situation, and have dealt with these mechanisms favorably in the past. It should also be noted that PRASA, does not differentiate public water systems as "majors" or "minors" because all public water systems are equally important for operational purposes.

The Operations Area of PRASA, currently keeps an inventory of all public water systems, which identifies all system intakes, surface or groundwater, and any stand-by reservoir or well. In an emergency situation, PRASA must identify, under the supervision of the DOH, which of the stand-by sources will be used. The establishment of any new wells by PRASA, in an emergency situation must be coordinated through the DNR.

Furthermore, the initial contingency planning requirements are legally implace under the legal authority granted to the DNR as discussed in Section A of this Chapter. Therefore, for the purposes of meeting the Federal statute of the WHP Program, <u>prior to implementation of the Program</u>, and in addition to the mechanisms currently inplace by the Commonwealth for an emergency response initiated by the detection of well or wellfield contamination, a generic Contingency Plan will be adopted to formally outline the aforementioned emergency planning procedures. This generic Contingency Plan will be developed by PRASA, and will receive the endorsement of the DOH and DNR given the fact that it must comply with drinking water regulations delegated to DOH and resources management delegated to the DNR. The generic Contingency Plan will identify, in addition to the procedures previously discussed:

-procedures for providing consumer notification during all phases of the water supply emergency;

-existing and future sources of water available during normal and emergency water supply conditions;

-availabe water storage, including source and distribution system storage;

-steps to be implemented, taken or followed during a water supply emergency, including state notification, emergency notification rosters of key water supply personnel with current telehpone numbers (both business and home), and follow-up correction action to minimize the re-occurence of an emergency;

-implementation of procedures of water conservation and water use restriction to be put in place during a water supply emergency;

-procedures for prioritization of potable water use during a water supply emergency.

Implementation of emergency planning procedures at other groundwater source community and non-community public water systems must be coordinated through the DOH, according to the population served.

CHAPTER 7

THIS PAGE WAS LEFT BLANK INTENTIONALLY

Chapter 7: New Wells

The Commonwealth of Puerto Rico has stated its public policy for the preservation of groundwaters as potential sources of drinking waters. Therefore, it is essential to protect groundwater quality in order to attain this use.

An increase in population and the detection of various contaminated wells on the Island reinforce the interest in improving potable water supply services. The WHPP is an ideal program for the prevention of contamination of drinking water sources in Puerto Rico.

A. Institutional Mechanisms for the Establishment of New Wells

The institutional mechanism that will guide the protection and management of new wells are included in the "Regulation for the Water Rights, Use, Conservation and Administration for the Waters of Puerto Rico", of the Department of Natural Resources, which was enacted in September 1984. The legal base for the enactment of this Regulation is greanted by the Organic Law of the Department of Natural Resources (Law No. 23 of July 20, 1972) and the Water Law (Law No. 136 of June 3rd, 1976).

This Regulation, which is enforced by the DNR, contains in Article 8 complete descriptions of responsibilities, technical review, procedures for objections, and franchise requirements for water rights.

On the franchise applications, the person or entity requesting the franchise must include the following among other considerations:

1. The location of the proposed well on a topographic maps of a scale of 1:20,000, including location by municipality, ward and street address.

2. A sketch of the property where the well will be placed with a complete description of the proposed extraction system, in addition to any other water extraction facility within a 1,000-foot radius.

3. Extraction rate and total water volumen which will be extracted annually.

4. The proposed use for the water.

In accordance to Article 7 of the aforementioned Regulation, under Section 7.4 any new Franchise request must be accompanied by an application for a Construction Permit for the new well. Furthermore, under Articles 7 and 8, the DNR may require analyses of the water quality of the proposed wells. The Construction Permits and Franchises must be requested by any person or entity, public or private, therefore encompassing the establishment of any drinking water well.

The Construction Permit and Franchise requirements inplace by the DNR provide the best and simplest means for including new wells in the Wellhead Protection Program.

B. Wellhead Protection Consideration for New Wells

The WHPP will allow for adequate planning and protection of new wells, if the Program is appropriately implemented. The current DNR Permit and Franchise requirements cover most of the considerations to be taken in the establishement of new wells.

To comply with WHPP requirements, DNR and EQB will establish, under the corresponding Memorandum of Agreement the following procedures for any drinking water well which complies with the definition of public water system:

1. The DNR will determine the proposed initial wellhead protection area of a fixed radius of 1,500 feet, as indicated in Chapter 3.
2. The DNR will forward to EQB the proposed new well and projected WHPA, so that EQB can identify all potential contamination sources within the protection area, according to Chapter 4.
3. EQB will also evaluate if potential contamination sources within the WHPA are implementing or can implement management approaches identified in Chapter 5.
4. EQB will endorse the establishment of the new well, after the required evaluation, prior to DNR's granting of the Construction Permit and Franchise for water rights.
5. Given the legal authority of DNR, this Department will determine if the Construction Permit and Franchise are viable taking into consideration EQB's endorsement or non-endorsement.

If the Construction Permit and Franchise are granted, DNR will inform EQB so that the new well and the corresponding WHPA can be included on overlays designating these areas on topographic maps of a scale of 1:20,000. From this point on, the new WHPA will be subject to the provisions included in this Program.

THIS PAGE WAS LEFT BLANK INTENTIONALLY

CHAPTER 8

THIS PAGE WAS LEFT BLANK INTENTIONALLY

Chapter 8: Summary of Public Participation in the Development of the Wellhead Protection Program

Section 1428(b) of the Safe Drinking Water Act requires that state WHP Programs be developed with the participation of the public.

In order to comply with this statute, the Environmental Quality Board held a public hearing on May 3rd, 1989, in order to receive comments and recommendations to the porposed draft of the Wellhead Protection Program for Puerto Rico, after appropriate notice of the hearing in two (2) local newspapers of Islandwide circulation. Comments were received to the draft proposal from the following agencies or persons:

-Department of Health (DOH)

-Puerto Rico Aqueduct and Sewer Authority (PRASA)

-Puerto Rico Planning Board (PRPB)

-Department of Natural Resources (DNR)

-Environmental Protection agency (EPA)

-Dr. Francisco D. Folch Castañer, University of Puerto Rico

-Dr. José Norat, University of Puerto Rico

The majority of the comments and recommendations made by these agencies or persons were considered in the preparation of this final document. Appendix 3 includes copies of the comment letters received. A Responsiveness Summary of the Public Hearing is included in Appendix 4.

On May 8 and 9, 1990 personnel from the Office of Groundwater Coordination of the Environmental Protection Agency in Region II met with personnel from EQB and representatives of DNR, PRASA, PRPB and the United States Geological Survey (USGS) to further discuss the development of the final WHP Program and the duties and responsibilities of these agencies in the implementation of the Program. These agencies, in addition to the Permits and Regulations Administration and the Departament of Health, have assigned contact personnel to help EQB in the development of the Program. EQB has held meetings with key personnel from the Planning Board, Permits and Regulations Administration and USGS to further attain a sound development of the Program.

Furthermore, personnel from the Groundwater Project of the EQB have presented conferences related to the Wellhead Protection Program to technical groups such as the Puerto Rican Association of Water Resources. Any education or outreach efforts initiated once the Program is implementable will be carried out by personnel from the Groundwater Project of the Water Quality Area of EQB.

APPENDIX 1

NOTE: ORIGINAL DOCUMENT PAGINATION WAS USED BY REGION 2 SAT 2 TO THIS POINT OF THE DOCUMENT. GVG

THIS PAGE WAS LEFT BLANK INTENTIONALLY

OFFICE OF THE GOVERNOR
SAN JUAN, PUERTO RICO 00901

July 31, 1986

Mr. Lee M. Thomas
Administrator
U. S. Environmental
Protection Agency
Office of Public Affairs (A-107)
Washington, D. C. 20460

Dear Mr. Thomas:

In reference to your letter dated July 10, 1986, please be advised that Governor Rafael Hernández-Colón has designated Mr. Santos Rohena-Betancourt, Chairman of the Environmental Quality Board, as the individual within the Commonwealth of Puerto Rico that will work with your agency in the development of the new ground-water protection programs under the 1986 amendments to the Safe Drinking Water Act.

We appreciate your commitment to provide maximum flexibility in the design and implementation of ground-water protection measures related to land use management.

You can contact Mr. Rohena directly at telephone number (809) 725-5140 or at the following address: Box 11488, Santurce, Puerto Rico 00910.

Cordially,

Luis A. Rivera-Cabrera
Adviser to the Governor
Planning and Government
Regulation

c.: Mr. Santos Rohena-Betancourt
Chairman
Environmental Quality Board

THIS PAGE WAS LEFT BLANK INTENTIONALLY

APPENDIX 2

THIS PAGE WAS LEFT BLANK INTENTIONALLY

COMMONWEALTH OF PUERTO RICO / OFFICE OF THE GOVERNOR

Environmental
Quality Board

April 1, 1991

Mr. Richard Caspe
Director
Water Management Division
USEPA - Region II
26 Federal Plaza
New York, NY 10278

Dear Mr. Caspe:

In response to the comments made by EPA on March 20, 1991 in reference to the Proposed Wellhead Protection Program (WHPP) we would like to inform you that annular injection of brines associated with oil and gas Production in classified as a Class V-A-6 injection facility. This is in accordance to the "Underground Injection Control Regulation" for Puerto Rico.

Annular injection, as defined in Section 1428(i) (2) of the Safe Drinking Water Act, is an activity which is not currently performed in Puerto Rico. The Underground Injection Control (UIC) Program, furthermore, has never issued a UIC Permit for Class V-A-6 injection well. Therefore, the WHPP is exempt from complying with Section 1428(i) (1) of the Act.

We look forward to a prompt response on the approval of this Program.

Cordially,

Tomás Rivera

Tomás Rivera Cabrera
Director
Water Quality Area

107

OFFICE OF THE BOARD: NATIONAL BANK PLAZA / 431 PONCE DE LEON AVE. / SANTURCE, PUERTO RICO 00910
P.O. BOX 11488 / SANTURCE, PUERTO RICO 00910 / TELEPHONE: 767-8181

THIS PAGE WAS LEFT BLANK INTENTIONALLY

APPENDIX 3

THIS PAGE WAS LEFT BLANK INTENTIONALLY

ESTADO LIBRE ASOCIADO DE PUERTO RICO
OFICINA DEL GOBERNADOR
JUNTA DE PLANIFICACION

Centro Gubernamental Minillas, Edif. Norte
Ave. De Diego, Pda. 22
Apdo 41119, San Juan, P.R. 00940 - 9985

18 de julio de 1989

Sr. Santos Rohena Betancourt
Presidente
Junta de Calidad Ambiental
Apartado 11488
Santurce, Puerto Rico 00910

Estimado señor Rohena Betancourt:

Se nos ha referido para estudio el documento titulado "Wellhead Protection Program" en el cual se describen las actividades para la implantación de este programa en la Junta de Calidad Ambiental (JCA), mediante delegación federal a través de la Agencia de Protección Ambiental. Según se desprende del documento, el propósito del programa es proteger las llamadas cabeceras de los pozos de extracción de aguas subterráneas que son utilizados como abastos públicos de acuerdo a las disposiciones de la Sección 1428 del "Safe Drinking Water Act", según enmendado.

En términos generales la Junta de Planificación endosa el establecimiento de un programa de esta naturaleza cuyo fin primordial es la protección de nuestros recursos de aguas subterráneas y consecuentemente la salud de nuestro Pueblo. Sin embargo, consideramos que la propuesta debe revisarse en los siguientes aspectos:

Comentarios Generales

1- La propuesta presume del lector un dominio completo de la situación prevaleciente en Puerto Rico sobre la extracción de las aguas subterráneas y los problemas que afectan el recurso en términos de cantidad y calidad. En la introducción del documento se debe proveer un marco de referencia más amplio donde se destaque la importancia de las aguas subterráneas para los diferentes usuarios y su potencial de extracción para satisfacer las demandas de estos sectores económicos. Sugerimos se incluyan datos generales sobre los diferentes ambientes geológicos de los acuíferos en

Puerto Rico, incrementos en el uso de agua por el sector doméstico, número de sistemas públicos en operación y población servida.

2- Las políticas públicas y objetivos esbozados en el Plan de Desarrollo Integral (PDI) para Puerto Rico reconocen la importancia de proteger la calidad de nuestros recursos de aguas subterráneas y la necesidad de controlar las actividades humanas y los usos de terreno que puedan afectarla adversamente, particularmente en las áreas de recarga de los acuíferos. Bajo el área de desarrollo de los recursos naturales, el PDI establece como objetivo la formulación del Plan Integral de Conservación, Desarrollo y Uso de los Recursos de Agua que se ordena preparar al Departamento de Recursos Naturales (DRN). La Ley de Aguas de Puerto Rico (Ley 136 del 3 de junio de 1976) establece que dicho plan se considerará como un plan sectorial conforme se dispone en la Ley Orgánica de la Junta de Planificación.

Conscientes de nuestra responsabilidad de orientar los programas gubernamentales hacia el logro de los objetivos trazados en el PDI y como miembro del Comité de Recursos de Agua, creado por la Ley de Aguas, nos preocupa la forma limitada en que se discuten las responsabilidades y prerrogativas del DRN en cuanto al recurso agua. En la propuesta, el rol reconocido al DRN se limita a la fase operacional de la otorgación de permisos de hincado de pozos y la concesión de franquicias de aprovechamiento de agua, ignorando responsabilidades de mayor envergadura que la Ley de Aguas le asigna en cuanto a la planificación de los usos futuros de los cuerpos de agua del país y la función del Secretario como administrador y custodio de este bien patrimonial. Entendemos que la Ley de Aguas es una legislación sumamente abarcadora y de mayor alcance que la Sección 1428 del "Safe Drinking Water Act" y de no reconocerse así en esta propuesta podrían surgir conflictos de índole legal en la implantación del programa.

Recomendamos se revise la propuesta para reflejar las facultades del DRN para intervenir en los siguientes aspectos: declaración de situaciones de emergencia, sustitución de fuentes de abasto, establecimiento y manejo de áreas de agua en estado crítico y establecimiento de un sistema de clasificación del recurso. Algunos de estos aspectos están actualmente cubiertos por disposiciones reglamentarias.

3- La propuesta carece de datos sobre presupuesto y fuentes de financiamiento para la implantación de las tareas que llevará a cabo el Programa. Entendemos que la nueva legislación federal provee subvenciones de hasta un 90% de los costos en que incurra el estado para el establecimiento de estos programas. La Sección 1428, Inciso (a) (4) sugiere la consideración de estos aspectos económicos.

Comentarios Específicos

1- Página 11

a- Debe aclararse que la Facultad de la Administración de Reglamentos y Permisos (ARPE) en la otorgación de permisos de uso en los "Wellhead Protection Areas" (WHPA) estará limitada a aquellos usos que ministerialmente sean permitidos por la reglamentación aplicable. Los demás usos serán considerados por la Junta de Planificación mediante el proceso de consulta de ubicación. El uso del término "land use permit" está incorrecto, debe ser sustituído por "use permit" o sea, permiso de uso, conforme lo establece la Ley Núm. 76 del 24 de junio de 1975.

b- Entre las actividades a realizarse por la ARPE, en coordinación con la JCA y la Junta de Planificación, se menciona el desarrollo de un mecanismo para controlar la expedición de permisos de uso en áreas designadas como fuentes potenciales de abasto de agua. La Junta de Planificación está facultada para establecer e implantar

113

usos de terrenos para las áreas de protección de los pozos de agua potable (WHPA). La tarea puede conllevar la zonificación de estas áreas.

2- Página 17 - En la selección de los pozos a ser incluídos en el proceso de delineación de los "WHPA" se establecen cuatro categorías de acuerdo a la razón de bombeo de los pozos:

Fase 1	-	Pozos de 1,000 galones por minuto (gpm) o más
Fase 2	-	Pozos de 500 - 1000 gpm
Fase 3	-	Pozos de 100 - 500 gpm
Fase 4	-	Pozos menores de 100 gpm

Se presume que los pozos de mayor capacidad deben ser protegidos primero por su alta producción de agua y población servida. Sugerimos se revise este orden de prioridades, ya que los pozos de abasto operando con capacidad de 1,000 gpm son pocos, si existe alguno con excepción de pozos en los acuíferos artesianos de la costa norte, los cuales por sus condiciones hidrogeológicas son menos propensos a episodios de contaminación. Por otro lado, los acuíferos llanos o freáticos por su alta permeabilidad y presencia de canales de disolución facilitan la entrada y movimientos de los contaminates. La mayoría de los pozos que opera la Autoridad de Acueductos y Alcantarillados (sobre 400) tienen una producción promedio de 100 a 200 gpm y se suplen de los acuíferos freáticos. Estamos seguros que la población total servida por estos pozos exceden por mucho a los de la Fase 1 y la Fase 2.

Sugerimos, además, que en la delineación de los WHPA se consideren las particularidades hidrológicas de la región donde ubica el pozo específicamente las variaciones en precipitación y nivel freático.

3- Página 28 - El itinerario propuesto para el inventario de las fuentes de contaminación en cada "WHPA" se afectaría como resultado de lo expresado en el comentario número 2.

4- Página 30 - Como una fuente de información para mantener y actualizar el Inventario de Fuentes con Potencial de Contaminación sugerimos se incluyan los permisos de uso que otorga ARPE.

5- Página 53 - Según indicáramos anteriormente, el DRN debe formar parte del comité designado para la preparación del Plan de Contingencia.

Esperamos que estos comentarios le sean de utilidad en la implantación de este programa.

Cordialmente,

Lina M. Dueño

Arq. Lina Dueño
Presidente Interina

THIS PAGE WAS LEFT BLANK INTENTIONALLY

UNIVERSIDAD DE PUERTO RICO, RECINTO DE CIENCIAS MEDICAS G.P.O. BOX 5067 SAN JUAN, PUERTO RICO 00936-TEL. 7
EX

FACULTAD DE CIENCIAS BIOSOCIALES Y ESCUELA GRADUADA DE SALUD PUBLICA
DEPARTAMENTO DE SALUD AMBIENTAL

RECIBIDO
JUN 21 1989
Area Calidad de Agua

9 de junio de 1989

Sr. Santos Rohena Betancourt
Presidente
Junta de Calidad Ambiental

Estimado señor Rohena:

Adjunto le someto los comentarios que hemos tenido a bién hacer el Dr. José A. Norat Ramírez y el subscribente. Los comentarios del Dr. Norat son más extensos y se hallan adjuntos.

Mis comentarios se reducen, fundamentalmente, a señalar que además de la protección del área inmediata alrededor del pozo, tiene mayor impacto y es de más importancia la protección de las zonas de recarga. Debe haber una política clara, de parte de la JCA, para proteger las zonas de recarga.

Tenemos conocimientos, por comentarios hechos ante nosotros, que una profesora del Recinto Universitario de Río Piedras está estudiando los mecanismos que facilitan el establecimiento de vertederos clandestinos en las zonas cársticas. Si le interesa esta información le sugiero que se comunique con el Dr. José Molinelli al teléfono 764-0000, Ext.2550.

Sin otro particular, quedo de usted,

Atentamente,

Francisco D. Folch Castañer, Ph.D.
Director del Departamento

Anejo
FF/stm

THIS PAGE WAS LEFT BLANK INTENTIONALLY

UNIVERSIDAD DE PUERTO RICO
ESCUELA GRADUADA DE SALUD PUBLICA
DEPARTAMENTO DE SALUD AMBIENTAL

A : Dr. Francisco D. Folch
Director del Departamento

DE : Dr. José Norat

ASUNTO : Comentarios al documento "Well-head Protection Program

1. Se necesita ver (en apéndice) la sección 1428 del SDWA para poder juzgar si el documento cumple con los requisitos de la ley federal incluyendo las enmiendas de 1986.

2. Se necesitan algunos datos mínimos sobre la situación real en Puerto Rico relativo a riesgos de contaminación de pozos de agua potable en las islas.

   Los arreglos institucionales se deben juzgar a la luz de la situación concreta.

3. Dada la situación de alto riesgo de contaminación de pozos en la costa norte, se debe estudiar la posibilidad de prohibir el uso de tanques soterrados.

   El programa debe designar a una agencia para llevar a cabo estudios de riesgo.

4. Se necesita establecer una política conjunta de todas las agencias para eliminar aquellas actividades que pongan en riesgo los pozos. Esto iría más allá que el otorgamiento de permisos de ubicación a actividades nuevas; incluiría alteración de permisos existentes.

5. Hay que definir que funciones específicas tendrá la Junta de Calidad Ambiental dentro del cumplimiento de su obligación de " control de contaminantes de acuíferos".

6. No se está contemplando una función para la Administración de Fomento Económico y para PRIDCO dentro del Programa. Estas podrían incluir los riesgos de contaminación de pozos dentro del análisis de impacto ambiental de las industrias que promueven.

   Se puede requerir lo anterior mediante reglamentación por la Junta de Calidad Ambiental.

7. Se deben publicar los mapas que haya preparado la Junta de Calidad Ambiental para cada pozo dentro de su banco de datos. De haber un mecanismo rápido de acceso a todos los datos por parte de la comunidad científica. El establecimiento de un centro de datos con acceso al público debe estar designado a una agencia especifica por el Programa.

8. El Programa debe proveer una participación directa del gobierno de Puerto Rico en la determinación de medidas remediativas para lugares contaminados dentro del programa "Superfund". El esfuerzo para lograr ésta participación debe ser conjunto de todas las agencias responsables y de las ramas de gobierno.

9. Es inaceptable la aseveración en las páginas 15-16, de que "el gol de áreas de manejo de campos de pozos, incluyendo porciones grandes de terreno, podrían ser impracticas para Puerto Rico". Por determinantes hidrológicas, las áreas de recarga de muchos pozos son grandes, y es importante que el programa establezca planes de manejo para <u>toda</u> el área de recarga.

10. Las prioridades establecidas en la pág. 17, en base a ritmos de bombeo de los pozos, no es racional. Otras alternativas de criterios para establecer prioridades son:

    a) el valor del acuífero a protegerse, en términos de flujo, profundidad, y facilidad de explotación.

    b) el número de personas afectadas en el futuro de contaminarse dicho acuífero.

11. El programa no contempla actividades de educación a la ciudadanía ni su participación en el manejo de las áreas de carga. Esto debe corregirse con prioridad.

DEPARTAMENTO DE RECURSOS NATURALES

DRN

MAY 3 1 1989

RECIBIDO
J.C.A.
1 - JUN/89
Oficina del Presidente
78

Hon. Santos Rohena Betancourt
Presidente
Junta de Calidad Ambiental
Apartado 11488
Santurce, Puerto Rico 00910

Estimado señor Rohena Betancourt:

Re: "Wellhead Protection Program"

Hemos recibido con interés el borrador final del documento titulado "Wellhead Protection Program". Luego de haberlo examinado sometemos los siguientes comentarios para que los mismos sean considerados en la redacción del documento final:

1. Debido que este programa está relacionado con la conservación del recurso agua, la participación del Departamento de Recursos Naturales debe ser más amplia que lo dispuesto en el documento de referencia.

2. Las responsabilidades del Departamento respecto al objeto del documento en cuestión son más de las identificadas en el mismo. Por lo tanto, sugerimos que la información de las páginas 5 y 6 respecto al Departamento lea como sigue:

"The DNR, a government agency established by Law No. 23 (Organic Law of the Department of Natural Resources of June 20, 1972) is responsible for the administration, management and enforcement of the Commonwealth policies, laws and regulations directed to the wise use of Puerto Rico's natural resources. Law No. 136 (The Water Law of June 3, 1976) dictates that DNR has the responsibility to conserve, develop and direct the use of Puerto Rico's water resources. The Puerto Rico Water Law empowered DNR to implement the public policy, rules and regulations related to water resources. The following duties delegated to DNR by this law are related to the WHPP."

a) Determine the extraction rate of groundwater; the recharge rate of aquifers, and the changes in water table levels.

b) Establish permit and franchise granting systems for the use of water bodies in Puerto Rico.

c) Regulate the design construction, operation, use, and closing of wells installed for the extraction of groundwater.

121

d) Undertake to inventory and register all Island wells.

e) Recommend to the Planning Board the adoption of rules and regulations to deal with development and land use actions that impact on water resources.

f) Recommend to the Governor, in coordination with other concerned Commonwealth agencies, the declaration of an emergency situation related to the use of water in the entire Island or in a specific area.

g) Develop the research needed to identify the mechanisms that permits the efficient use and conservation of the aquifers.

h) Establish a classification system for the water resources of the Island, including ground water resources.

i) Establish critical water districts or areas due to supply or quality problems.

According to the duties and responsibilities assigned to DNR, this agency within the WHP Program, will be in charge of the following:

a) Maintain a register of new and old wells that will include name, location, and permit or franchise information of these wells.

b) Collaborate in the preparation of rules or regulations to be submitted to the PB for the protection of designated areas.

b) Assist EQB in the delineation of wellhead protection areas.

d) Request the Governor to declare an emergency situation as requested by DOH or PRASA.

e) "Declare critical areas, as requested by EQB."

3. Página 8: Se debe indicar qué acción se tomará si luego de delimitar el área se encuentra que no hay usos que puedan afectar o contaminar el pozo.

4. Página 11: Señalar que la Junta de Planificación designará usos específicos en las áreas de protección de pozos según le sea solicitado por el DRN y la JCA.

El mecanismo de control de uso de terrenos más eficiente al momento es la zonificación. La creación de un distrito de zonificación para estas áreas sería beneficioso y de fácil implantación. El departamento participaría en el proceso de desarrollo de este distrito de zonificación.

5. Página 13: En las responsabilidades del USGS debe aparecer como que son delegadas por acuerdos cooperativos con instrumentalidades del ELA.

6. Página 34: La sección sobre el Departamento debe leer como sigue:

c) "Department of Natural Resources: Its jurisdiction includes a comprehensive responsibility for the planning and management of all natural resources. Among the statutes enforced by DNR related to WHPP are:

Title of the Law	Law Number	Date
Organic Law of the Department	23	20-06-1972
Control of Development in Floodable Areas	3	27-09-1961
Mining	9	18-08-1933
Natural Resources Ranger Corps Organic Law	1	27-06-1977
Water Law	136	03-06-1976

EQB and DNR will coordinate their effort to:

- identify all closed or abandoned wells
- develop zoning districts or other recomendations to be submitted to PB for protection of WHPA
- declare critical areas
- assist PRASA and DOH in the preparation of an Emergency Plan
- declare an emergency situation, as requested by PRASA or DOH
- delineate wellhead protection areas"

7. Página 38: En estas páginas se presentan los mecanismos de control de contaminación para fuentes dispersas y las agencias responsables de que se controlen los mismos. De igual forma deben presentarse los mecanismos de control para fuentes puntiformes.

8. Página 53: El DRN es la agencia con la responsabilidad de solicitar al Gobernador que declare una situación de emergencia respecto al recurso agua (Ley de Aguas, Ley Número 136 del 3 de julio de 1976, Artículo 5, Inciso h). Por lo tanto, el Departamento de Salud y AAA deben coordinar con el DRN el desarrollo del plan de contingencia que se menciona.

Estamos a sus órdenes para aclarar cualquier duda relacionada con este asunto.

Cordialmente,

por María M. Cruz de Cruz

José E. Laborde
Secretario

ESTADO LIBRE ASOCIADO DE PUERTO RICO
DEPARTAMENTO DE SALUD

9 de mayo de 1990

Draft

Sr. Santos Rohena Betancourt
Presidente
Junta de Calidad Ambiental
Edif. National Bank Plaza
Ave. Ponce de León # 431
Hato Rey, Puerto Rico 00917

RE : WELLHEAD PROTECTION PROGRAM (WHPP)

Estimado señor Rohena :

Recientemente recibimos una carta donde se nos invita a la reunión Inter-agencial en la Junta de Calidad Ambiental (J.C.A.) con el fin de revisar el documento "Wellhead Protection Program (WHPP)".

Deseo aclarar que hace aproximadamente un (1) año se nos hizo una invitación similar donde el documento WHPP iba a ser expuesto a vistas públicas, en las cuales nuestro Departamento debería emitir comentarios, sí alguno, sobre dicho proyecto. En aquella ocasión las vistas públicas fueron citadas para el 3 de mayo de 1989, y copia del documento para emitir comentarios, fué recibida en el Departamento de Salud el 5 de mayo de 1989. Sin embargo a tenor con la nueva invitación que se nos hace, redactamos nuestros comentarios en relación al WHPP, los cuales presentamos a continuación : En la página # 9 (2do parráfo) del documento WHPP, se establece que "el Departamento de Salud será el responsable de desarrollar e implementar en conjunto con A.A.A. un plan de contingencia ha ser utilizado en una emergencia donde los recursos de agua y la salud de la comunidad estén envueltos".

(1) Entendemos que la responsabilidad directa del desarrollo e implementación de éste plan de contigencia debe recaer sobre la A.A.A., agencia responsable de proveer un servicio adecuado que cumpla con los parámetros de calidad de agua potable, conjuntamente con la Junta de Calidad Ambiental y nuestro Departamento de Salud.

CALL BOX 70184 SAN JUAN, PUERTO RICO 00936

(2) Se debe evaluar y redefinir la agencia bajo la cuál recae la responsabilidad del desarrollo e implementación del Plan de Contingencia bajo el acuerdo a establecerse por MOA (Memorandums of Agreements) entre la Junta de Calidad Ambiental, A.A.A. y el Departamento de Salud.

(3) El Plan de Contingencia debe ser realizado por la agencia responsable de proveer el servicio de agua público entendemos que es la A.A.A. y por;

(4) La agencia responsable de protejer y manejar la calidad del agua subterránea, que a su vez es responsable del desarrollo e implantación de criterios de calidad, muestreo y control de contaminantes, y de asegurar la calidad de todas las aguas del Estado Libre Asociado de Puerto Rico (E.L.A.) incluyendo la calidad de las aguas a ser utilizadas como fuente de abasto para agua potable, lo cual se establece en las páginas 6,7 y 8 del WHPP, como responsabilidades de la Junta de Calidad Ambiental (J.C.A.).

(5) Nuestro Departamento formaría parte de éste plan de contingencia en lo que respecta a su responsabilidad de velar por la calidad del agua potable a ser servida a la comunidad y en establecer los estándares de calidad para agua potable para protejer la salud de los consumidores.

No obstante nuestro Departamento está en la mejor disposición de cooperar con el WHPP y todo lo que este conlleve. Sin embargo manteniendo nuestra perspectiva de agencia fiscalizadora debido a que en ningún momento trabajamos directamenta con la fase operacional, preservación, control y manejo de recursos de agua .

Sin nada más por el momento, quedo

Atentamente,

José E. Soler Zapata, M.D.
Secretario de Salud

AAA 13
8/79 (Rev.)

Memo

Fecha 11 de mayo de 1989

A	: Ing. Margarita Irizarry Coordinadora Especial	P/C:	
DE	: Nicolino Liberatore, Jefe Oficina de Recursos de Agua	P/C:	JCA
ASUNTO :	WELLHEAD PROTECCION PROGRAM		

MENSAJE:

Someto mis comentarios al documento de referencia que, en conjunto con los que haya recibido de otras áreas de la Autoridad, deberán ser sometidos a la JCA en o antes del día 24 de mayo de los corriente, fecha límite que concedió la Junta en ocasión de la Vista Pública del 3 de mayo de 1989.

Anexo

NL/mlt
cc: Ing. Guzmán
Ing. Quiñones
File (ORA)

Requiere contestación: Sí ☐ No ☐ Urgente: Sí ☐ No ☐

127

THIS PAGE WAS LEFT BLANK INTENTIONALLY

4 de mayo de 1989

Comentarios de la Oficina de Recursos de Agua al documento "Wellhead Protection Program", de marzo de 1989, presentado en forma de Borrador Final.

-La implementación de un Programa de Protección en Areas Inmediatas a Pozos de Aguas Potable, según planteado en el proyecto de la Junta, de llevarse a cabo en forma efectiva y sistemática, seria de gran beneficio para la Autoridad. Sin embargo es necesario mantener un balance entre la necesaria elasticidad de la implementación y los beneficios a la calidad del recurso derivados. Es decir: una implementación del programa según definido en el proyecto y con la rigidez típica de la aplicación de formulas preestablecidas podría crear serios problemas para el desarrollo de proyectos de la Autoridad donde la fuente de abasto es un pozo. Actualmente la Autoridad confronta normalmente atrasos significativos en los proyectos que contemplan la perforación de pozos debido a la dilación relacionada con los permisos de los dueños de los terrenos a que se lleve a cabo la obra.

Una vez se implemente el Programa, se haría más díficil conseguir los permisos de los dueños de terrenos, una vez se les haga concientes de las limitaciones en el uso del terreno en las áreas de protección alrededor del pozo.

La Autoridad se verá obligada probablemente a adquirir también los terrenos que estarán incluídos en el radio de protección del pozo.

-El procedimiento propuesto para delimitar el área de protección es muy general y simplista que no aplica para la mayoría de las condiciones reales, siendo un método típico de condiciones ideales de un acuífero freático uniforme y homogéneo. Para la delineación del área de protección se proponen dos métodos. En el método núm. 1 el radio de protección se computa en función del bombeo del pozo, además que de otros parámetros tales como la porosidad, y la profundidad del tubo ranurado instalado en el pozo. El radio resultaría directamente proporcional al bombeo e inversamente proporcional a la porosidad. En condiciones normales de operación de un pozo esto no concuerda con la realidad. Si el pozo puede producir mucha agua, es por el elevado valor de la Transmisividad y por lo tanto los abatimientos serán minimos y, por consiguiente, el radio del cono de depresión más pequeño.

Además, independientemente del método utilizado para definir el área de protección, esta no puede ser un círculo alrededor del pozo; muy probablemente deberá variar su configuración y ubicación en función de las características hidrodinámicas del acuífero. Por ejemplo, el área de protección de un pozo artesiano será necesario definirla a varias millas gradiente arriba del pozo y, en el caso de pozos perforados en acuíferos freáticos, el área de protección deberá definirse en función de la litología del acuífero y de su columna estratigrafica y en función de la dirección del flujo subterráneo y de su velocidad.

La porosidad es un parámetro que tampoco es muy representativo para caracterizar la hidrología de un acuífero; de hecho las arcillas tienen elevados valores de la porosidad y muy bajos valores de permeabilidad, al punto que se consideran impermeables, aún cuando estén saturadas de agua en una proporción casi del 100%.

En conclusión el criterio utilizado no refleja, como debería, las características hidraúlicas del acuífero.

Otro método propuesto para delimitar el área de protección se basa sobre el tiempo de concentración del flujo subterráneo, estableciendo para el radio de protección la distancia que el agua recorrería en 10 días.

En este caso tal parece que a lo largo de esta distancia eventuales contaminantes podrían ser neutralizados. Admitiendo que esto fuera cierto para bácteria y viruses, pero definitivamente no funcionaría en el caso de contaminantes no biodegradables o que no puedan ser eliminados por absorción u otros fenómenos fisico-quimicos en el ámbito del acuífero. Sin embargo, independientemente de la efectividad del método, debe efectuarse una corrección en la formula: en la formula propuesta, según está definida en el documento, la conductividad Hidraúlica (K) debe ser definida en pies/día y no en galones/día/pies^2, a menos que no se incluya el factor de conversión apropiado.

-En el caso de que no hay información disponible para determinar el radio de protección se fija una distancia de un mínimo de 1000 pies alrededor del pozo. En la mayoría de los casos hay información disponible y en el caso que no lo fuera sería más recomendable obtenerla por medio de una prueba de bombeo.

-A la luz de lo antes expuesto se recomienda que, de proponer unas formulas específicas, las mismas reflejen las características hidrogeológicas del acuífero. De otro lado también podría establecerse un críterio general y dejar al usuario la opción de utilizar un método valido y de conclusiones aceptables. Sin embargo,cualquiera que sea el procedimiento recomendado, se debe establecer un criterio de procedimiento en función del tipo de contaminante y en función de la hidrogeología del acuífero.

-En el proceso de identificación de fuentes de contaminación se establecieron nueve (9) categorias de fuentes potenciales. En las primeras ocho (8) categorias se incluye una serie de actividades las cuales están controladas por una reglamentación apropiada en lo que concierne al riesgo que representan para la calidad del agua y los impactos ambientales en general. En la categoría numero nueve se consideran los efectos de condiciones naturales accentuados por la actividad humana. Es decir que el programa de protección propuesto viene a sobreponerse a una serie de programas existentes y operantes cuyo objetivo, entre otros, incluye el de protección de la calidad del agua subterránea,independientemente de a que distancia se encuentre un pozo.

En esta perspectiva considero que el enfoque del programa, más que concentrarse en actividades que pueden representar una fuente pontencial de contaminación y que, repito, están ya reglamentadas, debe concentrarse en el riesgo que tiene un pozo de ser contaminado en terminos de las características hidrogeológicas del acuífero donde opera.

El procedimiento alterno propuesto es la preparación de un mapa o una serie de mapas a una escala apropiada, donde se definen áreas de diferente grado de riesgo de contaminación de acuífero. El mapa de riesgo podría obtenerse de la sobreposición de una serie de mapas temáticos representando los diferentes parámetros geológicos, morfológicos, hidrológicos, hidraúlicos, de tipo y uso de suelo etc. cuyo efecto combinado, derivante de la acción concomitante de todos los parámetros, definiría el grado de riesgo por cada área.

-No hay objección al procedimiento propuesto para establecer un orden de prioridad de intervención en función del caudal de extracción de agua subterránea.

-Una vez establecidos los criterios para identificar las áreas de intervención y después de definir un orden de prioridad, el Programa esbosa una estrategía de manejo, es decir en que forma se propone controlar las actividades en el ámbito de las áreas de protección al fin de evitar la contaminación de los pozos.

Fundamentalmente la acción propuesta consiste en la implementación de programas existentes y que se suponen esten ya implementados por una serie de Agencias tales como la misma JCA, la JP, el DRN, ARPE, DS etc, con el apoyo técnico de Agencias Federales tales como el SCS, ASA etc. Sucesivamente en el Capitulo identificado como : "Identification and Management Strategies for Uncontrolled Sources" esta situación se pone aún más claramente evidente.

En el ámbito de este capitulo, para cada tipo de fuente de contaminación difusa, se define una estrategia de acción la cual se puede sintetizar en los siguientes puntos recurrentes:

-Intervención de la Agencia concernida

-Implementación de un determinado programa

-Revisión de política pública

-Revisión y actualización de una reglamentación existente

-Introducción de nueva legislación

-Programas educativos nuevos.

-Revisión de ciertas prácticas de manejo.

Realmente no se establece una estrategia de acción clara y bien definida. Obviamente el campo de acción es muy vasto y complejo, máxime si se considera las responsabilidades a veces conflictivas de más de una Agencia para una misma situación.

La realidad es que del documento no desprende como se bregará con el problema, si no en la forma como se ha estado haciendo hasta el presente, con la diferencia que ahora se habrán definido unas áreas de protección alrededor de unos pozos.

Además que a veces la Estrategia de Acción se confunde con un Enfoque de la Estrategía de Acción, posponiendo a largo plazo la solución real a un problema real, como por ejemplo en el caso del control del uso de tanques sépticos en comunidades urbanás y rurales, donde se recomienda: enmendar la reglamentación existente, diseñar programas de información pública y proveer asistencia económica para facilitar el uso de métodos alternos de disposición en las áreas de protección.

Se puede observar que, de un lado, se procede en la identificación de las áreas, siguiendo un itinerario bien preciso (ver capítulo: "Procedures for Inventorying Sources Potentially Contaminating WPA's"), sin embargo en la etapa de implementación de los controles apropiados, el Programa se hace dilatorio e impractico.

-En el Cap.3, ("Phasing of Management Controls") se hace realmente patente lo prematuro que es la presentación del documento bajo estudio, para un escrutinio público.

Ya anteriormente se comentó sobre la falta de una clara definición de una estrategía de acción. Aqui se puede observar que los mismos fundamentos sobre los cuales debe basarse el documento están aún en una fase de desarrollo. Hasta tanto no se concluya el desarrollo del " Priority System" y la delimeación de las áreas de protección, no se podrá tener claro el alcance que se le requiere al Programa en su estrategia de acción.

Además es necesario llamar la atención sobre la marcada diferencia en la definición del propósito del " Priority System" que se dá en el documento.

En la pág. 21 se indica que "Recently the EQB... has been developing a Priority System to identify sites with potential for groundwater contamination" y sucesivamente en la pág. 23 se dá una lista de nueve(9) categorías de fuentes con potencial de contaminación. Esto hace entender que en el ámbito del "Priority System" se definen sitios con riesgo de contaminación en función de la ubicación de las diferentes fuentes de contaminación agrupadas en las nueves categorías.

Sin embargo en la pág. 51 la definición y criterios incluídos en la misma son muy contrastantes con la definición anterior.

Este es un aspecto determinante que debe ser aclarado.

-El programa requiere la definición de un Plan de Contingencia para Diciembre del año 1990, a cargo de la AAA y del DS bajo la supervición y asesoramiento de la JCA y EPA.

Aún cuando los acuíferos proveen un 20% del total de agua producida por la Autoridad, puede afirmarse que en la mayoría de los sistemas principales de acueductos hay uno o más pozos, lo que quiere decir que será necesaria una replanificación en la mayoría de las áreas de servicio de los sistemas de acueductos, para definir planes de contingencia según definidos en el documento (pág. 54). Esto conlleva una programación de trabajo, para lo cual la estructuración actual y limitación de personal representan una seria y real limitación.

Además en el Programa se preveen asignaciones del Gobierno de Puerto Rico "to provide and maintain the necessary equipment and personnel for the execution of this plan".

Esta es otra situación que se queda a nivel de enfoque y que no garantiza resultados reales en la etapa de implementación del programa, que es la fase más importante de cualquier acción dirigida a solucionar un problema.

-Bajo el título de "New wells", en pág. 56 del documento, se describe el procedimiento vigente para la ubicación, perforación y operación de un nuevo pozo en función de la reglamentación existente al amparo de la Nueva Ley de Agua administrada por el DRN. En el procedimiento no se mencionan los requisitos del Departamento de Salud, que entre otros análisis requiere, en la fase de aprobación de los planos de diseño, un Estudio Sanitario en el área de recarga del pozo, al fin de detectar eventuales fuentes de contaminación real o potencial.

Este requisito del DS me parece que es más realista que lo establecido en el ámbito del Programa de Protección en Areas Inmediatas a Pozos de Agua Potable, principalmente porque no se restringe el análisis a un área teórica, requiriendo el estudio sanitario en el área de recarga. De toda manera es necesario aclarar la relación entre los dos requisitos que a todas luces representan una duplicación de esfuerzos.

THIS PAGE WAS LEFT BLANK INTENTIONALLY

APPENDIX 4

THIS PAGE WAS LEFT BLANK INTENTIONALLY

RESPONSIVENESS SUMMARY: WELLHEAD PROTECTION PROGRAM
PUBLIC HEARING - MAY 3, 1989

AGENCY	COMMENT	RESPONSE
1. Puerto Rico Department of Health (DOH)	The DOH believes that the direct responsibility of the implementation of the Contingency Plan is PRASA. This agency is responsible of providing an adequate water supply in accordance with water quality standards of the DOH.	The Law for the Protection of Drinking Water Quality (Law No. 5 of July 21, 1977) grants the DOH the responsability of the protection of drinking water quality and the establishment of drinking water standards. This Department will also collaborate with PRASA in the implementation of the Contingency Plan which will be activated in any emergency situation in which groundwater resources prove to be effected by contaminants, thus causing adverse human effects. However, it is the DNR, under the authority granted to the secretary of the Department, which is responsible of declaring an emergency situation. See Chapter 6 of the Proposed Program. In the implementation of the Contingency Plan the DOH, PRASA, EQB and DNR all have important roles.

2. Department of Natural Resources (DNR)	The Program should indicate the actions that will be taken if after the establishment of a Wellhead Protection Area (WHPA) no potential pollution sources that affect the water quality of the well are identified.	When no potential pollution sources that affect the water quality of the protection area are identified, these areas will remain as WHPA, in order to prevent the establishment or to regulate the establishment of any potential pollution source within the area.
	The Program should indicate that the Puerto Rico Planning Board (PRPB) will designate specific uses for the WHPA'S according to EQB and DNR requests.	One of the responsibilities of the PRPB is the planning process for land uses that include the analysis, formulation and implementation of public policies, objectives and plans that guarantee the optional use of land for different purposes. The PRPB will designate wellhead Protection Areas at the request of EQB. Whenever this request is duly justified. See Chapter 2 of the Proposed Program.
	The most efficient control measure for land use is zonification. The creation of a zoning district for WHPA's would be beneficial and easily implementable. DNR can participate in the development of such districts.	As part of the WHPP, the PRPB will consider amendments to the zoning Regulation for Puerto Rico. EQB will make recommendations to the PRPB as to the possible amendments to be considered to comply with the Program. See Chapter 2

	of the Proposed Program.
The USGS responsabilities should be shown as functions delegated to the Agency through cooperative agreements and the Commonwealth.	Various Commonwealth and Federal agencies have the responsibility of protecting groundwaters, coordinating activities related to the protection of the resource, and develop investigations to obtain information from Island aquifers. One of these is the USGS, which should not limit it's expertise to only cooperative agreements.
Mechanism for the control of nonpoint sources are presented in the draft. There should also be included for point sources.	Chapter 5 briefly discusses the control programs that exist for all sources of pollution (see Chapter 4), that will be used in the implementation of the Program.
The DNR is the Commonwealth Agency with the responsibility of recommending to the Governor to declare an emergency situation related with water supply or quality (Water Law No. 136, July 3, 1976, Item 5,h). However, the DOH and PRASA should coordinate with the DNR the development of the Contingency Plan.	We accept this comment and have developed the response in Chapter 6 of the proposed program.

3. University of Puerto Rico, Medical Sciences Campus	The document should includ as an appendix a copy of Section 1428 of the Safe Drinking Water Act.	This appendix has not been included because copies of this Act are available in the library of the Environmental Quality Board and EPA Caribbean Field Office.
	Within the scope of the Program, EQB should study the possibility to prohibit the use of underground storage tanks (UST) in the north cost.	This comment has been considered and included in Chapter 2, Part A.4 of the document. In this part possible amendments, upon EQB's request the PRPB will consider amendments to the Zoning Regulation for PR (Regulation #4 of the PRPB) in order to further regulate the establishment of new UST's.
	The document should include the modification of existing permits for possible contamination activities.	This comment has been included in Chapter 5. In this chapter we have discussed the management approaches for contamination sources within the WHPA's.
	This Program should consider duties and responsiblities of the Administration for Economic Development and the Puerto Rico Industrial Development Company (PRIDCO).	This comment has not been included since each industry which is established in PRIDCO facilities must submit an Environmental Impact Statement according to Article 4(C) of Law #9 in which it has to indicate the general mechanisms for

	environmental protection, including WHPA's once the Program is implementable.
The maps with the contamination sources inventory should be published and made available to the public through rapid mechanisms.	Currently these maps are available to the public upon request to EQB. However, in the future these maps will be included in a Geographic Information System (Computarized) in which the access of this information will be more rapid.
The Program should provide for a direct participation of the Commonwealth of PR in the development of remediative actions in Superfund Sites.	In Chapter 5 we discussed the management approaches for superfund sites according to current regulations. The Federal Government has the sole responsibility of management of superfund sites.
The Program should establish management plans for all recharge areas.	In Chapter 3 we discussed the protection of recharge areas of the artesian aquifers by considering this whole area as an WHPA.
The Program should establish other criteria for delineation priorities of wells such as flow, depth, exploitation easiness, and number of affected persons in cases of contamination.	In Chapter 3, we have maintained the priority of delineation based on pumping rates, but we have considered if wells are the only drinking water source in the distribution system, these will receive

		a higher priority.
	The Program does not consider educational activities to the community.	This comment has been accepted and has been included in Chapter 8. The objective of EQB is to maintain a continuous education through workshops and conferences about the Program.
4. Puerto Rico Planning Board (PRPB)	The Introduction should include general inforamtion about the Island's aquifers, such as increase in the use of groundwater by the domestic sector, number of public systems and population served.	This comment has been accepted and included in Chapter 1, part A.
	The Program does not mention more important responsibilities of DNR, such as declare emergency situations of water supplies, establish and manage waters area in critical state and establish a classification system for water resources.	This comment has been included in Chapter 2, part A.6. It should be noted that throughout the proposed Program, DNR responsibilities are evident.
	The Program should mention information as to the budget and financial sources for Program implementation.	In Chapter 2, part B.1, EQB has included how this Program will financed the future EQB will evaluate other sources of financing.
	The term "land use permit" is incorrect and should be	

substituted for "use permit".	part A.5.
The PRPB can establish and implement land uses for WHPA's. This task will consider zonification of these areas.	This comment has been accepted included in Chapter 2, part A.4.
The delineation priority criteria for the wells should be revised. Priorities should not be based on pumping rate per minute.	Eventhough the priority has been been kept based on pumping rates, wells with higher extraction volumes and wells that serve greater populations will receive a higher priority during Phase II of the delineation process.
Particular hydrologic criteria of each well should be considered for WHPA delineation.	This comment has been included in Chapter 3. Except in Phase I (fixed radius) all other delineation criteria apply to hydrologic criteria of each well.
The Permits and Regulation Administration (PRA) use permits should be included in the pollution sources inventory.	All of PRA's use permits are issued to each contamination source identified in Chapter 4. The sources identified in this Chapter are more specific.

	The DNR should be included in the committee for the preparation of Contingency Plan.	This comment has been accepted and included in Chapter 6.
5. Puerto Rico Aqueduct and Sewer Authority (PRASA)	The implementation of the Proposed Program may present problems in the development of new wells by PRASA.	The priority of the WHP is the protection of the wellhead areas for wells. It will be responsibility of PRASA to include in the plannnig process, priorities in the development of new wells and consider all potential pollution sources near PRASA wells.
	The proposed procedures to delineate a Wellhead Protection Area are to general and simplistic, and are not applicable to real conditions.	This comment has been accepted and information related to wellhead protection area delineation has been modified. See Chapter 3 of the Proposed Program.
	In cases where well information is not available for delineating a protection area, a radius of 1000 ft is used. When this occurs a pump test should be performed to obtain well information.	In cases where well data are not available, a minimum radius of 1500 feet will be used to protect these area, and not 1,000 feet as originally stated.
	In the identification process of pollutant	The program serves as a consolidation mechanism to

sources, nine (9) categories of potential sources were established. The first eight (8) are regulated by law or specific Regulations. The proposed program comes to superpose other existing programs with the objective to protect the groundwater.

establish management approches to protect those areas with greater risk of well contamination, within protection areas. See Chapter 5 of this document.

The Program does not establish a clear and defined strategy in relation to source management.

This comment has been accepted. Chapter 5 discusses the strategies for the management of each source of contamination.

The principal water systems of the Authority have one or more wells. PRASA will have to redefine the majority of service areas of PRASA systems for implementation of contigency plans. This will consist in work programming, for which the current structuration and staff limitation represent a time limitation to the requirements of the Program.

This program is directed to implement a contingency plan to solve an emergency, in which human conditions are affected by contamination of wells and to detect potential causes or sources of the problem.

Under the Chapter "New Wells" in page 56, the draft document describes the current procedures for the location, perforation and operation of new wells in function of the new Water Law administrated by DNR. In the procedures included in the chapter the requirements of the Department of Health (DOH) are not mentioned.

This program is directed to the detection of pollutant sources that can affect the delineated wellhead area and regulat the pollutant risks associated with these sources. The Department of Health, does not detect pollutant sources in their studies, but evaluates the sample results for groundwater, while EQB is responsible of identifying pollution sources.

LAST PAGE OF REF.

REFERENCE 11

U.S. Environmental Protection Agency

Region 2 Water

Serving New Jersey, New York, Puerto Rico, US Virgin Islands and 7 Tribal Nations

Contact Us | Print Version Search: GO

EPA Home > Region 2 > Water > Wellhead Protection Program

Region 2 Home
A to Z Index
Recursos en Español
Newsroom

Wastewater Treatment
Watershed Protection
Water Bodies

Wellhead Protection Program

- The Safe Drinking Water Act Amendments of 1986 requested states to establish a Wellhead Protection Program (WHP) for ground water-based public water supplies. (The term "wellhead" is essentially synonymous with either a well or the column or "head" of water within a well.)

- Each state was asked to develop, with public participation, a Wellhead Protection Program Plan that was to be reviewed and approved by EPA. The Plan would describe how the state would accomplish the following three tasks:

  1. Determination of a wellhead protection area based on ground water flow and other hydrogeologic information;

  2. Development of an inventory of potential pollution sources within the wellhead protection area;

  3. Management and control of the potential sources of pollution identified within the wellhead protection area. Anticipated management techniques would range from purely voluntary approaches such as outreach and education to regulatory approaches such as ordinances containing land-use prohibitions.

- Between 1990 and 1991, New York, New Jersey, and Puerto Rico submitted Wellhead Protection Program Plans that were approved by EPA. (The U.S. Virgin Islands has not yet submitted its final plan for approval.)

- Since 1992, the states have been receiving EPA funding to implement the various components of wellhead protection. The states are required to submit to EPA a Biennial Wellhead Protection Report, summarizing their accomplishments.

WHP State Contacts:

- **New York**: Ron Entringer, NYSDOH, 518-458-6743
- **New Jersey**: Robert Kecskes, NJDEP, 609-777-1053
- **Puerto Rico**: Roberto Ayala, PREQB, 787-767-8073

Contact: Gould.Stephen@epa.gov

EPA Home | Privacy and Security Notice | Contact Us

Last updated on Wednesday, May 31st, 2006
URL: http://www.epa.gov/region02/water/whp.htm

THIS PAGE

Intentionally Blank

REFERENCE 12

U.S. Environmental Protection Agency

Superfund Information Systems

Superfund Site Information

SAN GERMAN GROUNDWATER CONTAMINATION

Site Information

Site Name: SAN GERMAN GROUNDWATER CONTAMINATION
Street: STATE ROAD #122
City / State / ZIP: SAN GERMAN, PR 00683

NPL Status: Not on the NPL
Non-NPL Status: PA Start Needed

EPA ID: PRN000205957
EPA Region: 02
County: SAN GERMAN

Federal Facility Flag: Not a Federal Facility

Return to Search Results Return to Search Superfund Site Information

U.S. Environmental Protection Agency

Superfund Information Systems

Recent Additions | Contact Us | Print Version Search: GO

EPA Home > Superfund > Sites > Superfund Information Systems > Search Superfund Site Information > Search Results > SAN GERMAN GROUNDWATER CONTAMINATION

Superfund Site Information

Site Documents

Data Element Dictionary (DED)

Order Superfund Products

Superfund Site Information

SAN GERMAN GROUNDWATER CONTAMINATION

Operable Units

Site Info | Aliases | Operable Units | Contacts
Actions | Contaminants | Site-Specific Documents

OU ID	OU Name
00	SITEWIDE
01	ENTIRE SITE

Return to Search Results **Return to Search Superfund Site Information**

DISCLAIMER: Be advised that the data contained in these profiles are intended solely for informational purposes use by employees of the U.S. Environmental Protection Agency for management of the Superfund program. They are not intended for use in calculating Cost Recovery Statutes of Limitations and cannot be relied upon to create any rights, substantive or procedural, enforceable by any party in litigation with the United States. EPA reserves the right to change these data at any time without public notice.

OSWER Home | Superfund Home

EPA Home | Privacy and Security Notice | Contact Us

URL: http://cfpub.epa.gov/supercpad/cursites/copinfo.cfm
This page design was last updated on Wednesday, December 20, 2006
Content is dynamically generated by ColdFusion

2

Superfund Site Information

Site Documents

Data Element Dictionary (DED)

Order Superfund Products

Superfund Site Information

SAN GERMAN GROUNDWATER CONTAMINATION

Actions

Site Info | Aliases | Operable Units | Contacts
Actions | Contaminants | Site-Specific Documents

OU	Action Name	Qualifier	Lead	Actual Start	Actual Completion
00	DISCOVERY		F		09/01/2006

Return to Search Results

Return to Search Superfund Site Information

3

THIS PAGE
INTENTIONALLY BLANK

REFERENCE 13

WESTON SOLUTIONS, INC.
SITE ASSESSMENT TEAM 2
PROJECT NOTE

TO: San German Groundwater Contamination File (W.A. No.: 52)
FROM: Dennis J. Foerter, CHMM
DATE: 26 April 2007

SUBJECT: San German Source Investigation

In January 2007, EPA conducted a source investigation of three sites in San German identified as potential sources to the chlorinated solvent contamination of Puerto Rico Aqueduct and Sewer Authority (PRASA) public supply wells (i.e., Retiro, Lola Rodriguez de Tio I and Lola Rodriguez de Tio II) in San German, Puerto Rico. The three sites included Wallace International, Acorn Cleaners, and an Abandoned Gulf Station. A map, indicating the location of each of these sites, is attached to this project note. The source investigation included the use of direct-push technology to complete soil borings at each of the facilities. Surface and subsurface soil samples and ground water samples were collected from these borings. A description of each facility, including a discussion of the analytical results from the January 2007 source investigation, is presented below:

Site 1: Wallace International

The Wallace International facility (Wallace) consists of two buildings located on Calle B within the Retiro Industrial Park. The site is located in a mixed commercial/light industrial/residential area of San German, Puerto Rico. The facility property is owned by the Puerto Rico Industrial Development Company (PRIDCO).

Current operations at the facility include the casting and finishing of table flatware. Operations have taken place at the current facility since 1973. Wallace also operated in the Retiro Industrial Park under the name of International Silver de PR, Inc. In addition to the current facility, Wallace also operated in Retiro Industrial Park's Building No. S-1404-0-87, located on Calle A northwest of the existing facility buildings. According to Wallace personnel, the current facility was previously used by another company for the manufacture of softballs. Seventy employees currently work at the facility.

During its operational history, the facility generated spent solvents including tetrachloroethylene (PCE), trichloroethylene (TCE), and 1,1,1-trichloroethane (TCA). Other wastes include spent corrosive liquids, which include nitric and sulfuric acids. Disposal of wastes are regulated under Wallace's Resource Conservation and Recovery Act (RCRA) Small-Quantity Generator (SQG) permit (EPA ID No. PRD090405648).

In July 2006, the Weston Solutions, Inc. Region 2 Site Assessment Team 2 (SAT 2), accompanied by EPA and the Puerto Rico Environmental Quality Board (PREQB), conducted a facility inspection at the Wallace International site. During this inspection, the acid storage area was noted to be in good condition with secondary containment. Waste solvents and oils were observed to be stored outside in the rear of the facility building. During the inspection the acid storage area was noted to be inside the facility. This area was noted to be in good condition with secondary containment. During the inspection of the waste storage area in the rear exterior of the facility, drums of TCE and waste oil were observed to be stored on asphalt with no secondary containment. The asphalt was noted to be in poor condition, with cracks and several areas of exposed soil. Several drums were rusted, with one observed to be bulging. Broken fluorescent bulbs were noted in an area behind a concrete retaining wall. A half-buried drum and an oil spill (with absorbent spread over it) were also noted in this area. Poor housekeeping was noted throughout the rear exterior of the facility.

During the July 2006 facility inspection, Wallace personnel stated that storm water is discharged under a National Discharge Pollutant Elimination System multi-sector permit with EPA. The facility is also permitted by PREQB for air emissions associated with the facility's generator, oxidation baths, and evaporators. Wallace personnel indicated that an on-site well exists on the facility; however, the well is not currently in use. There are no monitoring wells or septic tanks/fields on the facility. PREQB files indicate that the facility has two underground storage tanks listed as "permanently out-of-use." One tank contained diesel fuel; however, the database does not indicate the contents of the other tank.

From 22-24 January 2007, Region 2 SAT 2 conducted a sampling event at the Wallace facility. During this event, surface soil, subsurface soil, and groundwater samples were collected from borings advanced by direct-push technology. Borings were advanced on the current Wallace facility, as well as on two other parcels previously occupied by Wallace. Samples were analyzed for Target Compound List (TCL) volatile organic compounds (VOCs) and Target Analyte List (TAL) metals (excluding cyanide) through the EPA Contract Laboratory Program (CLP). Analytical results from this sampling event indicated the presence of VOCs in soil and groundwater beneath the facility. VOCs detected in soil included PCE (up to 2,000 micrograms per kilogram [ug/kg]), TCE (up to 3,300 ug/kg), cis- 1,2-dichlorothene (up to 5,000 ug/kg), and vinyl chloride (up to 900 ug/kg). VOCs detected in groundwater included PCE (up to 19,000 micrograms per liter [ug/L]), TCE (up to 2,900 ug/L), cis-1,2-dichlorothene (up to 700 ug/L), and vinyl chloride (up to 150 ug/L)

__Site 2: Acorn Cleaners__

Acorn Cleaners (Acorn) is located on the western side of Route 122 (just south of its intersection with Calle Luna) on the southern end of the Antongiorgie Building. Acorn has operated at this location since 1970. Prior to 1970, the land was utilized for agricultural purposes. Acorn currently provides dry cleaning and laundry services to its customers. Since beginning operations, Acorn has utilized a total of two dry cleaning machines; one from 1970 to 1991 and one from 1991 to the present. From 1970 to 1991, the facility used approximately five to six drums of tetrachloroethylene (PCE) per year. Since 1991, the facility has used approximately one drum of PCE per year. Filters are changed twice per year with used filters being picked up by a waste hauler from San Juan. Acorn was unable to provide documentation for the disposal of the filters. A cooling tower (and associated water tank) is located outside the southwest corner of the building. During an on-site reconnaissance conducted by SAT 2, a drum of PCE was observed to be stored on the floor inside the building. The rear (i.e., western side) of the property consists of a paved parking lot. An aboveground diesel fuel tank is located in the southwest corner of this parking lot. Residential properties border the Acorns Cleaners to the south. There are no known monitoring wells or underground storage tanks on the site.

As part of the San German Site Discovery Initiative, Region 2 SAT 2 conducted an on-site reconnaissance of the Acorn facility in July 2006. During the reconnaissance, a drum of PCE was observed to be stored within the site building. The drum was noted to be in good condition; no apparent spills or discharges were noted. According to facility personnel, PCE has been used as part of the dry cleaning process since 1970. The exterior of the site building is paved.

On 26 January 2007, Region 2 SAT 2 conducted a sampling event at the Acorn Cleaners facility. During this event, surface soil, subsurface soil, and groundwater samples were collected from borings advanced by direct-push technology. Samples were analyzed for TCL VOCs through the EPA CLP. Analytical results from this sampling event indicated the presence of PCE in one surface soil sample (depth: 0.5-1 foot below ground surface), located immediately south of the Acorn Cleaners facility. PCE was detected in this sample at an estimated concentration of 3.1 ug/kg. PCE was not detected in groundwater samples collected in association with the Acorn Cleaners site.

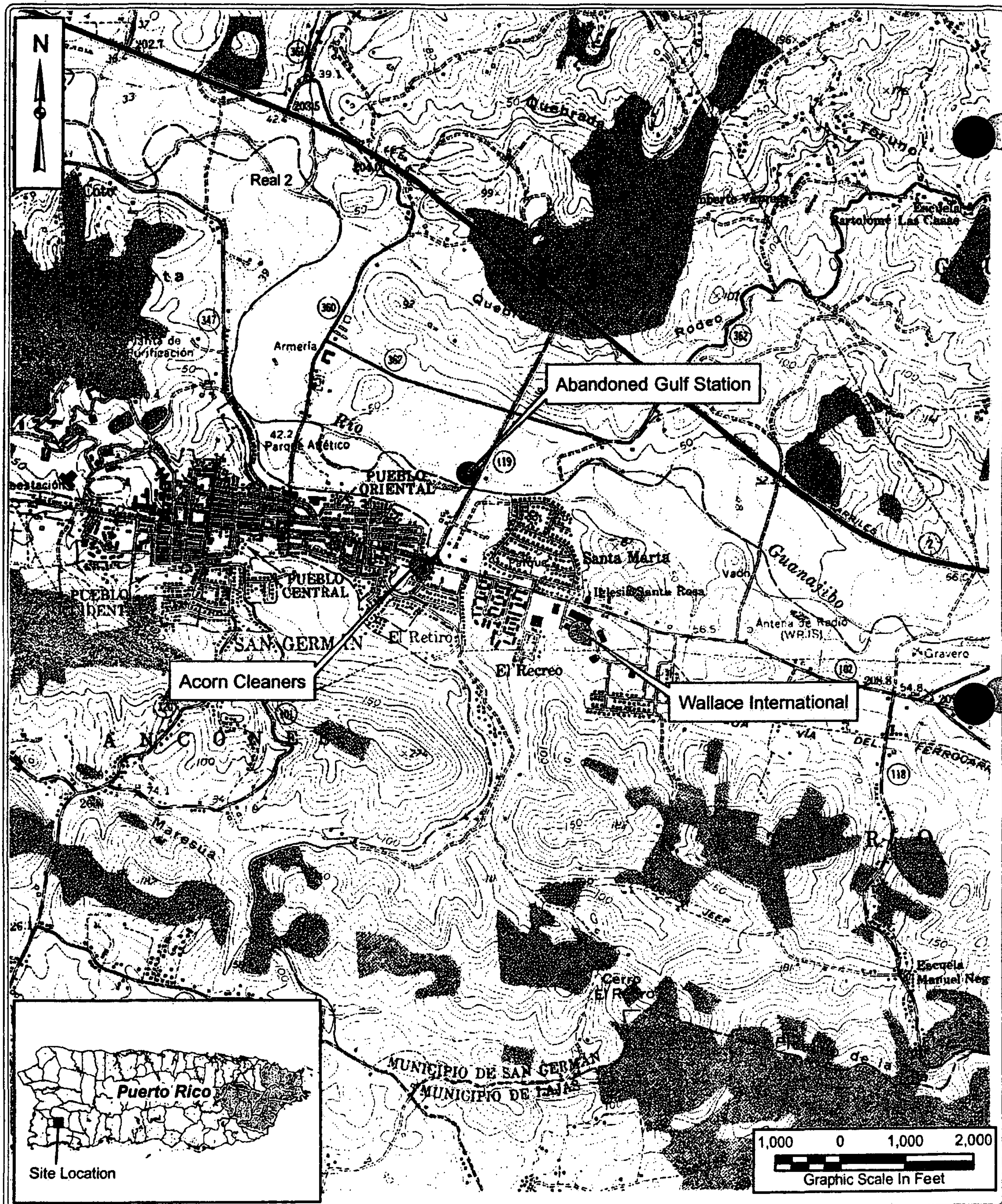
__Site 3: Abandoned Gulf Station__

During the week of 17 July 2006, Region 2 SAT 2 , EPA, and the Puerto Rico Environmental Quality Board (PREQB) personnel conducted a facility inspection of an abandoned gulf station located on the western side of Route 122 (aka Road 119) just north of Rio Guanajibo. According to the PREQB, the Puerto Rico Road Authority (Autoridad de Carreteras) took ownership of the property in November 2005. The property is reportedly part of the upcoming widening of Route 122. During the facility inspection, the building was observed to be dilapidated with car parts, broken glass, empty drums, and miscellaneous debris located throughout the building and property. An open overhang was observed on the south side of the building. This area was likely used for light mechanical purposes (oil changes) and for washing vehicles. There is a room in the rear of the building believed to have been used for the storage of used oils. Empty drums and tires were observed near the rear of the building. Construction materials (likely for the widening of Route 122) were observed in the rear of the building. The status of underground storage tanks at the facility is unknown. No monitoring wells were observed during the facility inspection.

On 25 January 2007, Region 2 SAT 2 conducted a sampling event at the Wallace facility. During this event, surface soil, subsurface soil, and groundwater samples were collected from borings advanced by direct-push technology. Borings were advanced on the current Wallace facility, as well as on two other parcels previously occupied by Wallace. Samples were analyzed for TCL) VOCs and TAL metals (excluding cyanide) through the EPA CLP. Analytical results from this sampling event indicated the presence of low estimated concentrations of VOCs associated with petroleum in a soil boring located north of the former gas station. These included benzene, toluene, ethylbenzene, and xylenes. Chlorinated solvents were not detected in soil or groundwater samples collected at the site.

Attached to this project note are sample location maps and data tables summarizing the analytical results from sampling events conducted at the Wallace International (pages 4-9), Acorn Cleaners (pages 10-12), and Abandoned Gulf Station sites (pages 13-15).

Signature/Date Denny Foerst 4/26/07



LEGEND

Approximate Site Location

SOURCE

7.5 Minute Series Topographic Quadrangle: San German, PR.

PROJECT

San German Sites

CLIENT NAME

EPA

TITLE

Site Location Map
San German Sites
San German, PR

(4)

WESTON SOLUTIONS

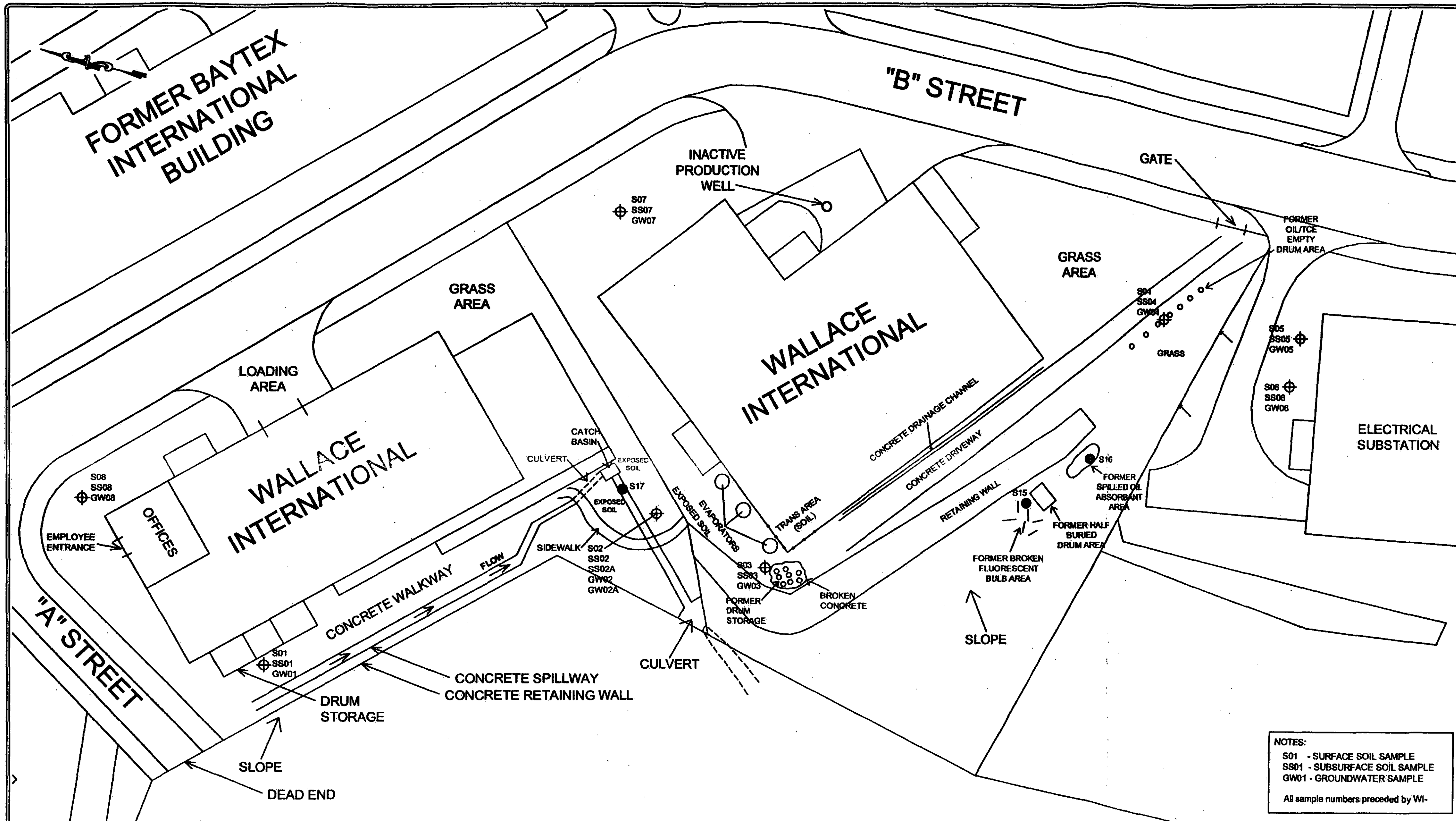
DATE

11/20/2006

FIGURE #

1

P:\SAT2\Wallace_International\GIS\MXD\03816_RFP_Site_Map.mxd



NOTES:
S01 - SURFACE SOIL SAMPLE
SS01 - SUBSURFACE SOIL SAMPLE
GW01 - GROUNDWATER SAMPLE

All sample numbers preceded by WI-

LEGEND: NOT TO SCALE
⊕ - BORING LOCATION
● - SURFACE SOIL SAMPLE

PROJECT: WALLACE INTERNATIONAL
SAN GERMAN, PUERTO RICO

TITLE: SAMPLE LOCATION MAP
CURRENT WALLACE INTERNATIONAL FACILITY

CLIENT NAME: U.S. EPA
SAT2

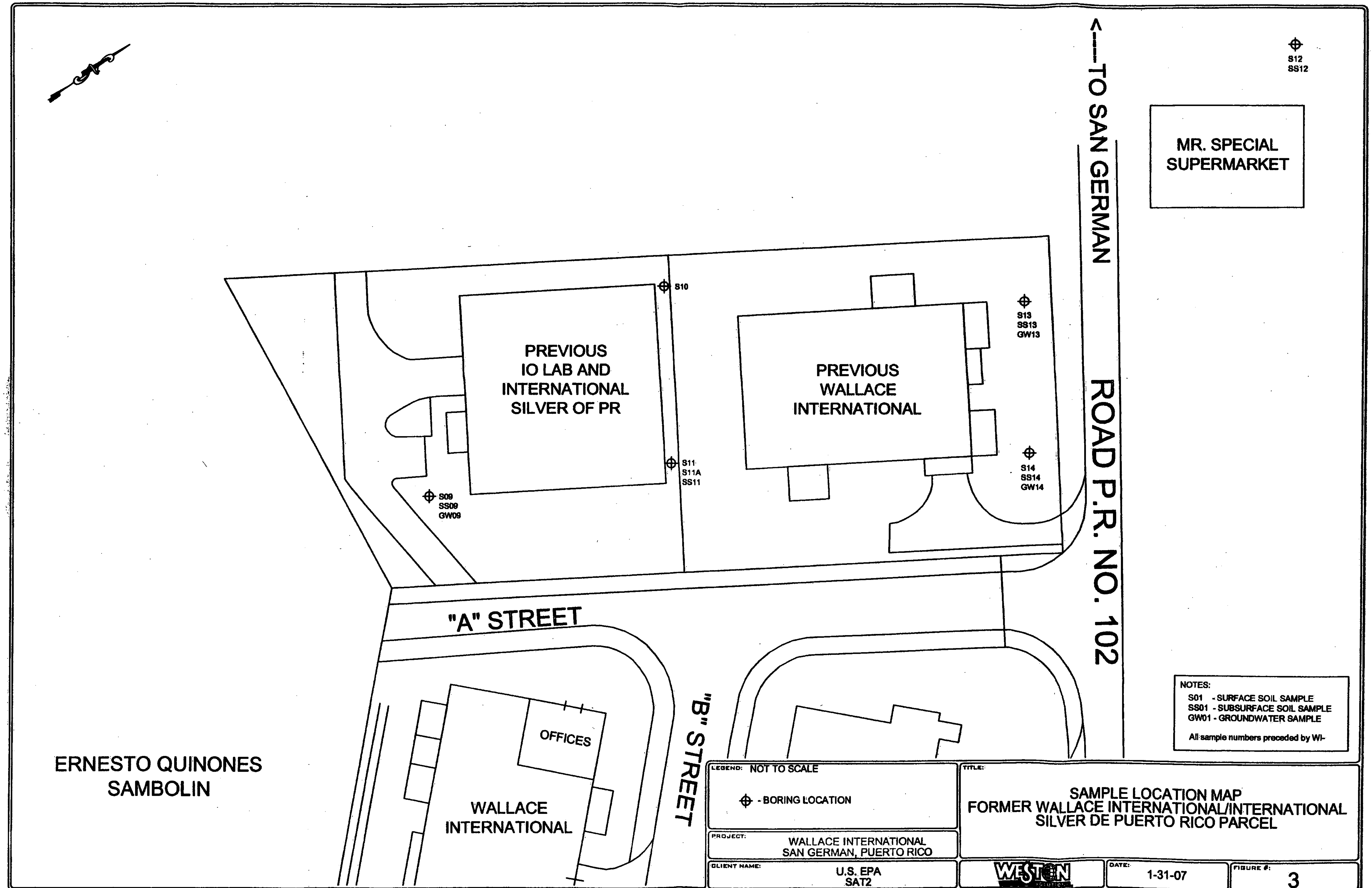
WESTON SOLUTIONS

DATE: 1-31-07

FIGURE #: 2

P:\EPA\Wallace\GIS\CAD\0107_Siteplan\04046_Samp_Loc.dwg

(5)



P:\EPA\Wallace\GIS\CAD\0107_Siteplan\04047_Samp_Loc.dwg

Wallace International
VOC Soil Results - January 22-24, 2007
Case No. 36113

SAT 2 Sample No.	WI-S01	WI-SS01	WI-S02	WI-SS02	WI-SS02A	WI-S03	WI-SS03	WI-S04	WI-SS04	WI-S05	WI-SS05	WI-S06	WI-SS06	WI-S07	WI-SS07	WI-S08	WI-SS08	WI-S09
EPA Sample No.	B3RR4	B3RR6	B3RR7	B3RR8	B3RR9	B3RS2	B3RS3	B3RS5	B3RS6	B3RS8	B3RS9	B3RT1RE	B3RT2	B3RT4	B3RT5	B3RT7	B3RT8	B3RW0
Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Unit	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
	0.5-1.0 ft	19.5-20 ft	0.5-1.0 ft	13-14 ft	13-14 ft	1-2 ft	28-29 ft	0.5-1.0 ft	28-28.5 ft	0.5-1.0 ft	12-13 ft	0.5-1.0 ft	19-20 ft	0.5-1.0 ft	22.5-23 ft	0.5-1.0 ft	13.5-14 ft	0.5-1.0 ft
Dichlorodifluoromethane	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
Chloromethane	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
Vinyl Chloride	8.0 U	7.3 U	5.9 U	400 J	900	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
Bromomethane	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
Chloroethane	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
Trichlorofluoromethane	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
1,1-Dichloroethene	8.0 U	1.7 J	5.9 U	5.8 J	6.2 J	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	1.9 J	7.4 U	4.3 U	4.1 J	6.4 U	6.1 U	6.2 U
1,1,2-Trichloro-1,2,2-trifluoroethane	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
Acetone	16 U	15 U	12 U	13 U	13 U	13 U	12 U	12 U	13 U	14 U	12 U	15 U	15 U	8.5 U	14 U	21	12 U	12 R
Carbon Disulfide	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	2.3 J	6.1 U	6.2 U
Methyl Acetate	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
Methylene Chloride	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	5.8 J	6.1 U	6.2 U
trans-1,2-Dichloroethene	8.0 U	7.3 U	5.9 U	28	27	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
Methyl-tert-butyl ether	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
1,1-Dichloroethane	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
cis-1,2-Dichloroethene	8.0 U	7.3 U	33	1400 J	6000	6.4 U	6.0 U	120	110	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	5.1 J	6.2 U
2-Butanone	16 U	15 U	12 U	13 U	13 U	13 U	12 U	12 U	13 U	14 U	12 U	15 U	15 U	8.5 U	14 U	13 U	12 U	12 R
Bromochloromethane	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
Chloroform	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
1,1,1-Trichloroethane	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
Cyclohexane	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
Carbon Tetrachloride	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
Benzene	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
1,2-Dichloroethane	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
1,4-Dioxane	160 R	150 R	120 R	130 R	130 R	130 R	120 R	120 R	130 R	140 R	120 R	150 R	150 R	85 R	140 R	130 R	120 R	120 R
Trichloroethene	8.0 U	7.3 U	970	1800	3300	1.9 J	6.0 U	860 J	210	6.9 U	3.8 J	7.4 U	7.4 U	4.3 U	3.0 J	6.4 U	6.1 U	6.2 U
Methylcyclohexane	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
1,2-Dichloropropane	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
Bromodichloromethane	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
cis-1,3-Dichloropropene	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
4-Methyl-2-Pentanone	16 U	15 U	12 U	13 U	13 U	13 U	12 UJ	12 U	13 U	14 UJ	12 UJ	15 U	15 UJ	8.5 U	14 U	13 U	12 U	12 UJ
Toluene	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	2.9 J	6.1 U	6.2 U
trans-1,3-Dichloropropene	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
1,1,2-Trichloroethane	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
Tetrachloroethene	8.0 U	2000	170	610	1100	6.4 U	6.0 U	110	1700	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	800	6.4 U	6.1 U	6.2 U
2-Hexanone	16 U	15 U	12 U	13 U	13 U	13 U	12 UJ	12 U	13 U	14 UJ	12 UJ	15 U	15 UJ	8.5 U	14 U	13 U	12 U	12 UJ
Dibromochloromethane	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
1,2-Dibromoethane	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
Chlorobenzene	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
Ethylbenzene	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
m,p-Xylene	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
o-Xylene	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
Styrene	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
Bromoform	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 R	7.4 U	4.3 U	6.9 U	6.4 R	6.1 U	6.2 U
Isopropylbenzene	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
1,1,2,2-Tetrachloroethane	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 U	7.4 U	4.3 U	6.9 U	6.4 U	6.1 U	6.2 U
1,3-Dichlorobenzene	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 R	7.4 U	4.3 U	6.9 U	6.4 R	6.1 U	6.2 U
1,4-Dichlorobenzene	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 R	7.4 U	4.3 U	6.9 U	6.4 R	6.1 U	6.2 U
1,2-Dichlorobenzene	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 R	7.4 U	4.3 U	6.9 U	6.4 R	6.1 U	6.2 U
1,2-Dibromo-3-Chloropropane	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 UJ	5.8 U	6.3 U	6.9 UJ	5.9 UJ	7.4 R	7.4 UJ	4.3 U	6.9 U	6.4 R	6.1 U	6.2 UJ
1,2,4-Trichlorobenzene	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 R	7.4 U	4.3 U	6.9 U	6.4 R	6.1 U	6.2 U
1,2,3-Trichlorobenzene	8.0 U	7.3 U	5.9 U	6.6 U	6.5 U	6.4 U	6.0 U	5.8 U	6.3 U	6.9 U	5.9 U	7.4 R	7.4 U	4.3 U	6.9 U	6.4 R	6.1 U	6.2 U

Results reported in micrograms per kilogram (µg/kg)
Shading indicates a positive detection
UJ - Contaminant not detected
U - Contaminant not detected
J - Estimated Concentration
R - Rejected
Sample SS02 is a duplicate of sample SS02A; Sample S11A is a duplicate of sample S11

Wallace International
VOC Soil Results - January 22-24, 2007
Case No. 36113

SAT 2 Sample No.	WI-SS09	WI-S10	WI-S11	WI-S11A	WI-SS11	WI-S12	WI-SS12	WI-S13	WI-SS13	WI-S14	WI-SS14	WI-S15	WI-S16	WI-S17
EPA Sample No.	B3RW1	B3RW3	B3RW6	B3RW7	B3RW8	B3RX0	B3RX1	B3RX3	B3RX4	B3RX6	B3RX7	B3RX9	B3RY0	B3RY1
Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Unit	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
	14.5-15 ft	0.5-1.0 ft	1.5-2.0 ft	1.5-2.0 ft	29-30 ft	2.0-2.5 ft	33-34 ft	1.5-2.0 ft	24-25 ft	1.5-2.5 ft	18.5-19	0.0-0.5 ft	0.0-0.5 ft	0.0-0.5 ft
Dichlorodifluoromethane	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
Chloromethane	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
Vinyl Chloride	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
Bromomethane	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
Chloroethane	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
Trichlorofluoromethane	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
1,1-Dichloroethene	7.0 U	6.4 U	7.0 U	6.9 U	2.6 J	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
1,1,2-Trichloro-1,2,2-trifluoroethane	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
Acetone	14 U	13 U	14 R	14 R	12 U	12 U	10 U	11 U	14 U	14 U	14 U	9.5 U	8.7 U	13 U
Carbon Disulfide	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
Methyl Acetate	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	5.5 J	6.4	16
Methylene Chloride	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
trans-1,2-Dichloroethene	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
Methyl-tert-butyl ether	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
1,1-Dichloroethane	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
cis-1,2-Dichloroethene	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
2-Butanone	14 U	13 U	14 R	14 R	12 U	12 U	10 U	11 U	14 U	14 U	14 U	9.5 U	8.7 U	65
Bromochloromethane	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
Chloroform	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
1,1,1-Trichloroethane	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
Cyclohexane	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
Carbon Tetrachloride	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
Benzene	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
1,2-Dichloroethane	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
1,4-Dioxane	140 R	130 R	140 R	140 R	120 R	120 R	100 R	110 R	140 R	140 R	140 R	95 R	87 R	130 R
Trichloroethene	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	2.5 J
Methylcyclohexane	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
1,2-Dichloropropane	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
Bromodichloromethane	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
cis-1,3-Dichloropropene	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 UJ	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
4-Methyl-2-Pentanone	14 UJ	13 UJ	14 R	14 R	12 UJ	12 UJ	10 UJ	11 U	14 UJ	14 UJ	14 UJ	9.5 U	8.7 U	13 U
Toluene	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	2.6 J	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
trans-1,3-Dichloropropene	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 UJ	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
1,1,2-Trichloroethane	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 UJ	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
Tetrachloroethene	7.0 U	6.4 U	7.0 U	6.9 U	140	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
2-Hexanone	14 UJ	13 UJ	14 R	14 R	12 UJ	12 UJ	10 UJ	11 U	14 UJ	14 UJ	14 UJ	9.5 U	8.7 U	13 U
Dibromochloromethane	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
1,2-Dibromoethane	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
Chlorobenzene	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
Ethylbenzene	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	2.9 J	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
m,p-Xylene	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	13	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
o-Xylene	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	3.2 J	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
Styrene	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
Bromoform	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 R
Isopropylbenzene	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
1,1,2,2-Tetrachloroethane	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 U
1,3-Dichlorobenzene	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 R
1,4-Dichlorobenzene	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 R
1,2-Dichlorobenzene	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 R
1,2-Dibromo-3-Chloropropane	7.0 UJ	6.4 UJ	7.0 UJ	6.9 UJ	6.1 UJ	6.1 UJ	5.1 UJ	5.5 U	6.9 UJ	6.9 UJ	6.8 UJ	4.8 U	4.4 U	6.4 R
1,2,4-Trichlorobenzene	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 R
1,2,3-Trichlorobenzene	7.0 U	6.4 U	7.0 U	6.9 U	6.1 U	6.1 U	5.1 U	5.5 U	6.9 U	6.9 U	6.8 U	4.8 U	4.4 U	6.4 R

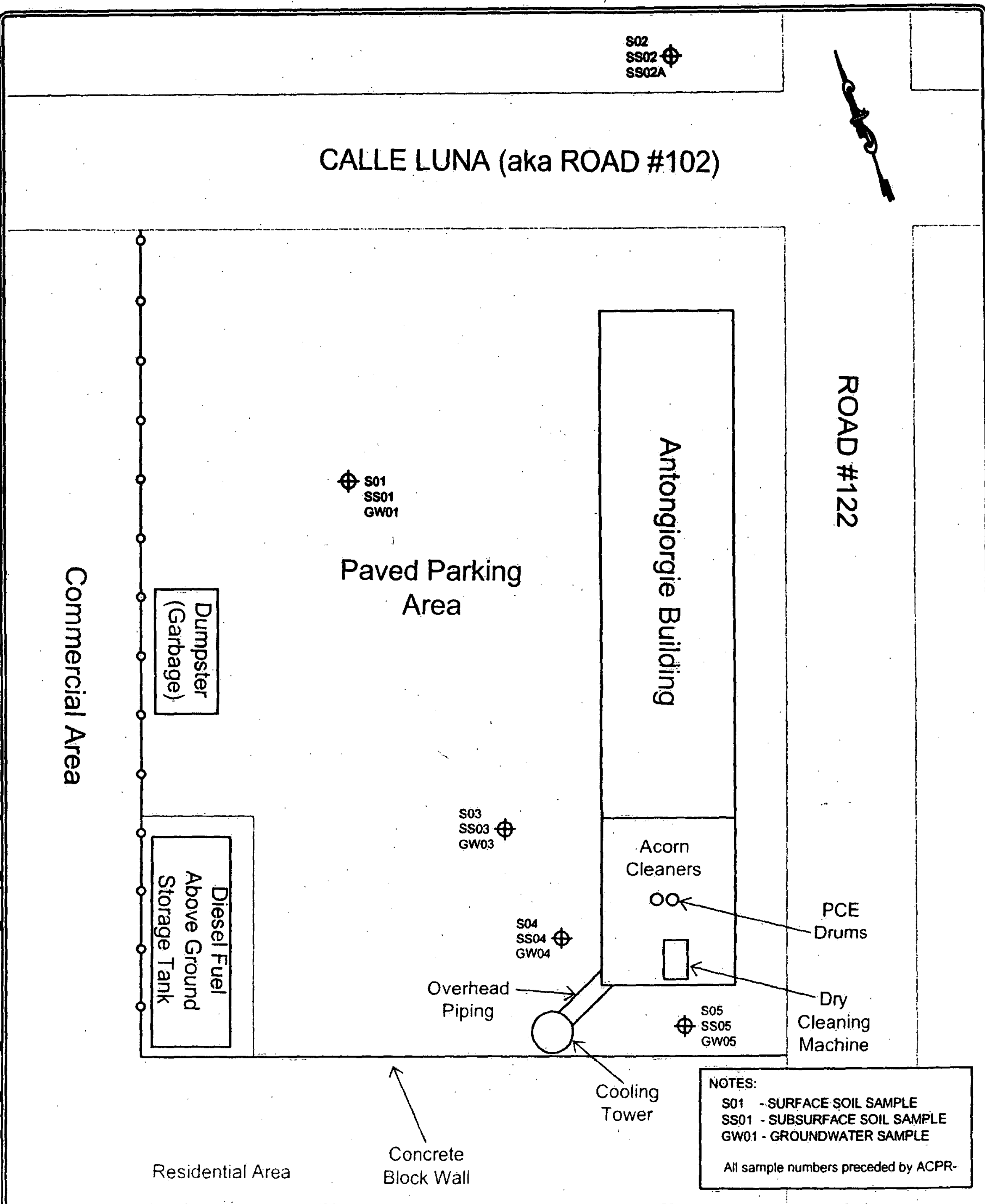
Results reported in micrograms per kil
Shading indicates a positive detection
UJ - Contaminant not detected
U - Contaminant not detected
J - Estimated Concentration
R - Rejected
Sample SS02 is a duplicate of sample

8

Wallace International
VOC Groundwater Results - January 22-24, 2007
Case No. 36113

SAT 2 Sample No.	WI-GW01	WI-GW02	WI-GW02A	WI-GW03	WI-GW04	WI-GW05	WI-GW06	WI-GW07	WI-GW08	WI-GW09	WI-GW13	WI-GW14	WI-RIN01	WI-RIN02	WI-RIN03	WI-TB01	WI-TB02	WI-TB03
EPA Sample No.	B3RR6	B3RS0	B3RS1	B3RS4	B3RS7	B3RT0	B3RT3	B3RT6	B3RT9	B3RW2	B3RX5	B3RX8	B3RY3	B3RY4	B3RY5	B3RY6	B3RY7	B3RY8
Matrix	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Unit	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
Sample Depth	20 ft	22 ft	22 ft	29.5 ft	28.5 ft	29 ft	24 ft	23 ft	14 ft	15 ft	32 ft	32 ft	NA	NA	NA	NA	NA	NA
						Background	Background						Field Blank	Field Blank	Field Blank	Trip Blank	Trip Blank	Trip Blank
Dichlorodifluoromethane	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 UJ	5.0 U	5.0 U	5.0 U
Chloromethane	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 UJ	5.0 U	5.0 U	5.0 U
Vinyl Chloride	5.0 U	100	150	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromomethane	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 UJ	5.0 U	5.0 U	5.0 U
Chloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 UJ	5.0 U	5.0 U	5.0 U
Trichlorofluoromethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethene	8.0	27	27	5.0 U	5.0 U	1.1 J	5.0 U	76	14	5.0 U	26	31.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2-Trichloro-1,2,2-trifluoroethane	3.2 J	3.9 J	4.2 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	10 U	10 U	10.0 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Carbon Disulfide	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 UJ	5.0 U	5.0 U	5.0 U
Methyl Acetate	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methylene Chloride	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
trans-1,2-Dichloroethene	5.0 U	7.1	11	5.0 U	2.2 J	5.0 U	5.0 U	5.0 UJ	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl-tert-butyl ether	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	6.7	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
cis-1,2-Dichloroethene	14	620 J	700 J	10 U	160	5.0 U	5.0 U	29 J	31	5.0 U	5.0 U	8.6 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Butanone	10.0 U	10.0 U	10.0 U	5.0 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bromochloromethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloroform	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	2.7 J	3.0 J	3.0 J	3.0 J	3.1 J	3.0 J
1,1,1-Trichloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Cyclohexane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Carbon Tetrachloride	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,4-Dioxane	100.0 R	100.0 R	100 R	100 R	100 R	100 R	100 R	100 R	100 R	100 R	100 R	100 R	100 R	100 R	100 R	100 R	100 R	100 R
Trichloroethene	16	610 J	600 J	8.8	2900	46	18	73	33	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methylcyclohexane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloropropane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromodichloromethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
cis-1,3-Dichloropropene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-Pentanone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Toluene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
trans-1,3-Dichloropropene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2-Trichloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Tetrachloroethene	8900	19000	16000	5.0 U	220	5.0 U	5.0 U	4500	1500	5.0 U	690	680	4.6 J	2.0 BJ	1.5 BJ	3.0 J	1.9 J	3.2 J
2-Hexanone	10 U	10.0 U	10.0 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibromochloromethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dibromoethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Ethylbenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
m,p-Xylene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
o-Xylene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Styrene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromoform	5.0 U	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 U	5.0 U	5.0 UJ	5.0 UJ	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 U	5.0 U	5.0 UJ	5.0 U	5.0 U
Isopropylbenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2,2-Tetrachloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,3-Dichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,4-Dichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dibromo-3-Chloropropane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2,4-Trichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2,3-Trichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U

Results reported in micrograms per liter (µg/L)
Shading indicates a positive detection
UJ - Contaminant not detected
U - Contaminant not detected
J - Estimated Concentration
R - Rejected
Sample GW02A is a duplicate of sample GW02



LEGEND:
Not to scale
⊕ - BORING LOCATION

TITLE:
SAMPLE LOCATION MAP

PROJECT:
Acorn Cleaners
San German, Puerto Rico

CLIENT NAME: EPA

WESTON

DATE: Feb 02 2007

FIGURE #: 2

P:\EPA\San German\GIS\CAD\0107 Acorn Cleaners\04049 Samp Loc.dwg

Acorn Cleaners
Volatile Organic Compound (VOC) Soil Results - January 26, 2007
Case No. 36112

SAT 2 Sample No.	ACPR-S01	ACPR-SS01	ACPR-S02	ACPR-SS02	ACPR-SS02A	ACPR-S03	ACPR-SS03	ACPR-S04	ACPR-SS04	ACPR-S05	ACPR-SS05
EPA Sample No.	B3RZ4	B3RZ5	B3RZ7	B3RZ8	B3RZ9	B3S02	B3S03	B3S05	B3S06	B3S08	B3S09
Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Unit	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Sample Depth	0.5-1.0 ft	14-15 ft	0.5-1.0 ft	13-14 ft	13-14 ft	0.5-1.0 ft	6.5-7 ft	0.5-1.0 ft	12-13.5 ft	0.5-1.0 ft	15-16 ft
Comment					Duplicate		[illegible]			Background	Background
Dichlorodifluoromethane	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
Chloromethane	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
Vinyl Chloride	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
Bromomethane	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
Chloroethane	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
Trichlorofluoromethane	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
1,1-Dichloroethene	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
1,1,2-Trichloro-1,2,2-trifluoroethane	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
Acetone	15 U	12 U	11 U	11 U	11 U	28	10 U	19 U	14 U	13 U	12 U
Carbon Disulfide	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
Methyl Acetate	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
Methylene Chloride	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
trans-1,2-Dichloroethene	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
Methyl-tert-butyl ether	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
1,1-Dichloroethane	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
cis-1,2-Dichloroethene	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
2-Butanone	14 U	12 U	11 U	11 U	11 U	14 U	10 U	12 U	13 U	13 U	12 U
Bromochloromethane	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
Chloroform	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
1,1,1-Trichloroethane	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
Cyclohexane	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
Carbon Tetrachloride	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
Benzene	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
1,2-Dichloroethane	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
1,4-Dioxane	140 R	120 R	110 R	110 R	110 R	140 R	100 R	130 R	130 R	130 R	130 R
Trichloroethene	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
Methylcyclohexane	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
1,2-Dichloropropane	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
Bromodichloromethane	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
cis-1,3-Dichloropropene	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 UJ	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
4-Methyl-2-Pentanone	14 U	12 U	11 U	11 U	11 U	14 U	10 U	12 U	13 U	13 U	12 U
Toluene	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
trans-1,3-Dichloropropene	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 UJ	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
1,1,2-Trichloroethane	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 UJ	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
Tetrachloroethene	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	3.1 J	6.2 U
2-Hexanone	14 U	12 U	11 U	11 U	11 U	14 UJ	10 U	12 U	13 U	13 U	12 U
Dibromochloromethane	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
1,2-Dibromoethane	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
Chlorobenzene	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 UJ	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
Ethylbenzene	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
m,p-Xylene	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
o-Xylene	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
Styrene	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
Bromoform	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
Isopropylbenzene	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
1,1,2,2-Tetrachloroethane	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
1,3-Dichlorobenzene	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 UJ	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
1,4-Dichlorobenzene	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 UJ	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
1,2-Dichlorobenzene	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 UJ	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
1,2-Dibromo-3-Chloropropane	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 U	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
1,2,4-Trichlorobenzene	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 UJ	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U
1,2,3-Trichlorobenzene	6.8 U	5.8 U	5.7 U	5.7 U	5.6 U	7.2 UJ	5.1 U	6.2 U	6.4 U	6.4 U	6.2 U

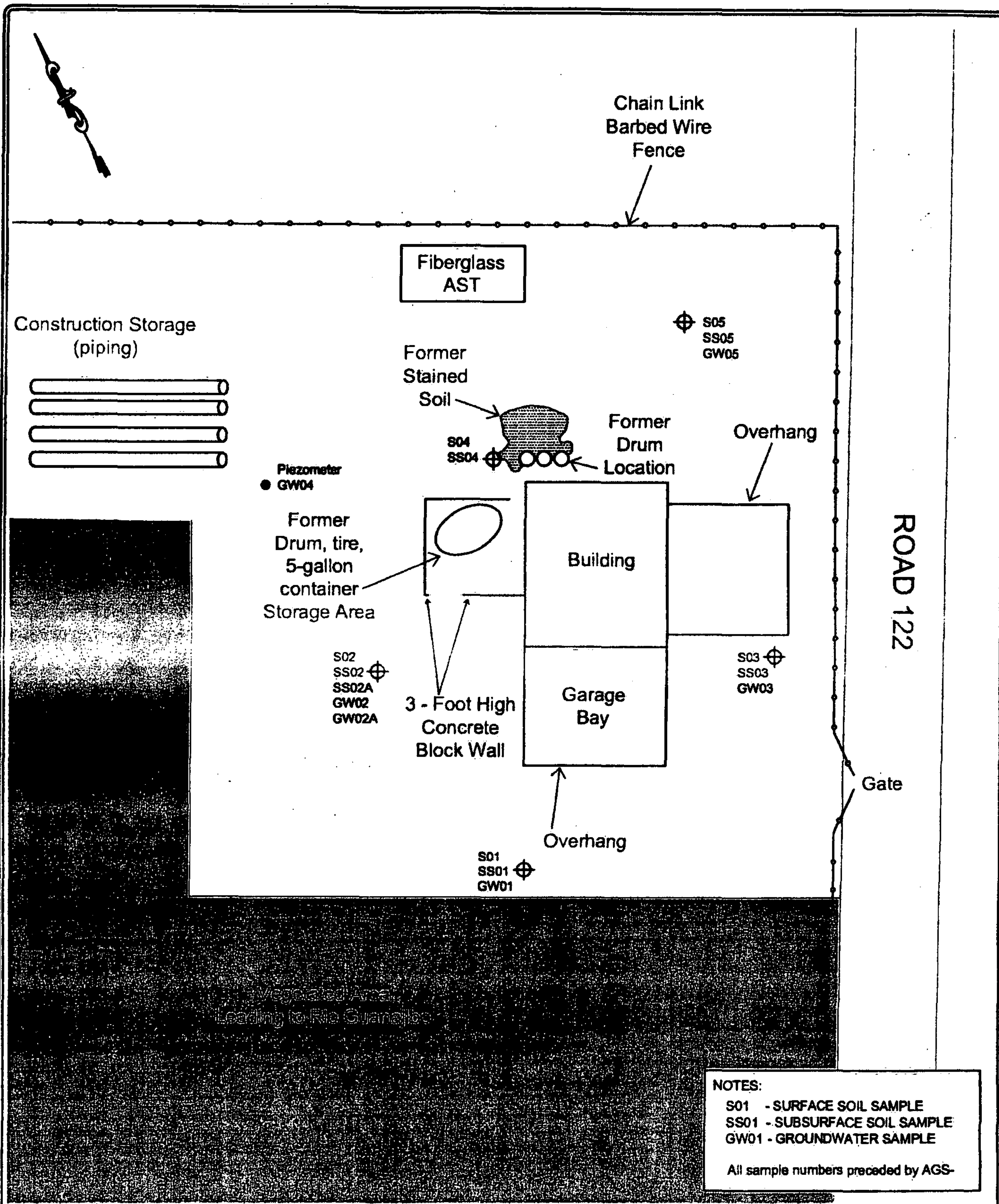
ug/kg - micrograms per kilogram
U - Contaminant not detected
UJ - Contaminant not detected
R - Rejected
J - Estimated concentration
Note: Sample depths presented in feet below ground surface

11

Acorn Cleaners
Volatile Organic Compound (VOC) Groundwater Results - January 26, 2007
Case No. 36112

SAT 2 Sample No.	ACPR-GW01	ACPR-GW03	ACPR-GW04	ACPR-GW05	ACPR-RIN01	ACPR-TB01
EPA Sample No.	B3RZ6	B3SO4	B3S07	B3S10	B3S11	B3S12
Matrix	Water	Water	Water	Water	Water	Water
Unit	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Sample Depth	15 ft	7 ft	15 ft	16 ft	NA	NA
Comments				Background	Rinsate	Trip Blank
Dichlorodifluoromethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloromethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Vinyl Chloride	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromomethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Trichlorofluoromethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2-Trichloro-1,2,2-trifluoroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	21	10 U	11 U	14 U	6.5 J	10 U
Carbon Disulfide	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl Acetate	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methylene Chloride	5.0 U	5.0 U	5.0 U	5.0 U	0.90 J	5.0 U
trans-1,2-Dichloroethene	5.0 U	5.0 U	5.0 UJ	5.0 U	5.0 U	5.0 U
Methyl-tert-butyl ether	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
cis-1,2-Dichloroethene	5.0 U	5.0 U	5.0 UJ	5.0 U	5.0 U	5.0 U
2-Butanone	10 U	10 U	10 U	10 U	10 U	10 U
Bromochloromethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloroform	5.0 U	5.0 U	5.0 U	5.0 U	2.0 J	2.7 J
1,1,1-Trichloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Cyclohexane	5.0 U	5.0 U	5.0 U	5.0 U	0.61 J	0.74 J
Carbon Tetrachloride	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,4-Dioxane	100 R	100 R	100 R	100 R	100 R	100 R
Trichloroethene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methylcyclohexane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloropropane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromodichloromethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
cis-1,3-Dichloropropene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-Pentanone	10 U	10 U	10 U	10 U	10 U	10 U
Toluene	5.0 U	5.0 U	5.0 U	5.0 U	0.75 J	0.56 J
trans-1,3-Dichloropropene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2-Trichloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Tetrachloroethene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Hexanone	10 U	10 U	10 U	10 U	10 U	10 U
Dibromochloromethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dibromoethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Ethylbenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
m,p-Xylene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
o-Xylene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Styrene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromoform	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Isopropylbenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2,2-Tetrachloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,3-Dichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,4-Dichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dibromo-3-Chloropropane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2,4-Trichlorobenzene	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ
1,2,3-Trichlorobenzene	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ

ug/L - micrograms per liter
U - Contaminant not detected
UJ - Contaminant not detected
R - Rejected
J - Estimated concentration
Note: Sample depths presented in feet below ground surface



LEGEND:

Not to scale

● - PIEZOMETER LOCATION

⊕ - BORING LOCATION

TITLE:

SAMPLE LOCATION MAP

PROJECT:

Abandoned Gulf Station
San German, Puerto Rico

CLIENT NAME: EPA

WESTON

DATE: Jan 31 2007

FIGURE #: 2

P:\EPA\San German\GIS\CAD\0107_Gulf_Station\04048_Samp_Loc.dwg

Abandoned Gulf Station
Volatile Organic Compounds (VOC) Soil Results - January 25, 2007
Case No. 36111

SAT 2 Sample No.	AGS-S01	AGS-SS01	AGS-S02	AGS-SS02	AGS-SS02A	AGS-S03	AGS-SS03	AGS-S04	AGS-SS04	AGS-S05	AGS-SS05
EPA Sample No.	B3S24	B3S35	B3S27	B3S28	B3S29	B3S32	B3S33	B3S35	B3S36	B3S38	B3S39
Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Unit	UG/KG	UG/KG	UG/KG	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Sample Depth	0.5-1.0 ft	29.5-30 ft	0.5-1.0 ft	22-25 ft	22-25 ft	0.5-1.0 ft	21.5-22.5 ft	0.5-1.0 ft	29-29.5 ft	0.5-1.0 ft	29.5-30 ft
										Background	Background
Dichlorodifluoromethane	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
Chloromethane	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
Vinyl Chloride	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
Bromomethane	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
Chloroethane	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
Trichlorofluoromethane	1.3 J	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
1,1-Dichloroethene	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
1,1,2-Trichloro-1,2,2-trifluoroethane	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
Acetone	12 U	8.5 U	11 U	10 U	9.9 U	12 U	12 U	13 U	19	11 U	10 U
Carbon Disulfide	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
Methyl Acetate	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
Methylene Chloride	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
trans-1,2-Dichloroethene	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
Methyl-tert-butyl ether	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
1,1-Dichloroethane	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
cis-1,2-Dichloroethene	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
2-Butanone	12 U	8.5 U	11 U	10 U	9.9 U	12 U	12 U	13 U	13 U	11 U	10 U
Bromochloromethane	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
Chloroform	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
1,1,1-Trichloroethane	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
Cyclohexane	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
Carbon Tetrachloride	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
Benzene	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
1,2-Dichloroethane	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
1,4-Dioxane	120 R	85 R	110 R	100 R	99 R	120 R	120 R	130 R	130 R	110 R	100 R
Trichloroethene	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
Methylcyclohexane	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
1,2-Dichloropropane	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
Bromodichloromethane	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
cis-1,3-Dichloropropene	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
4-Methyl-2-Pentanone	12 U	8.5 U	11 U	10 U	9.9 U	12 U	12 U	13 U	13 U	11 U	10 U
Toluene	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	1.2 J
trans-1,3-Dichloropropene	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
1,1,2-Trichloroethane	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
Tetrachloroethene	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
2-Hexanone	12 U	8.5 U	11 U	10 U	9.9 U	12 U	12 U	13 U	13 U	11 U	10 U
Dibromochloromethane	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
1,2-Dibromoethane	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
Chlorobenzene	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
Ethylbenzene	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	1.1 J
m,p-Xylene	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	4.8 J
o-Xylene	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	1.2 J
Styrene	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
Bromoform	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
Isopropylbenzene	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
1,1,2,2-Tetrachloroethane	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
1,3-Dichlorobenzene	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
1,4-Dichlorobenzene	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
1,2-Dichlorobenzene	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
1,2-Dibromo-3-Chloropropane	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
1,2,4-Trichlorobenzene	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U
1,2,3-Trichlorobenzene	5.9 U	4.3 U	5.5 U	5.2 U	5.0 U	5.8 U	5.8 U	6.6 U	6.7 U	5.7 U	5.2 U

14

ug/kg - micrograms per kilogram
U - Contaminant not detected
UJ - Contaminant not detected
R - Rejected
J - Estimated concentration
Note - sample depths presented in feet below ground surface
Shading indicates a positive detection

Abandoned Gulf Station
Volatile Organic Compound (VOC) Groundwater Results - January 25, 2007
Case No. 36111

SAT 2 Sample No.	AGS-GW01	AGS-GW02	AGS-GW02A	AGS-GW03	AGS-GW04	AGS-GW05	AGS-RIN01	AGS-TB01
EPA Sample No.	B3S26	B3S30	B3S31	B3S34	B3S37	B3S40	B3S41	B3S42
Matrix	Water	Water	Water	Water	Water	Water	Water	Water
Unit	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Sample Depth	30 ft	25 ft	25 ft	30 ft	30 ft	30 ft	NA	NA
						Background	Field Blank	Trip Blank
Dichlorodifluoromethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloromethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Vinyl Chloride	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromomethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Trichlorofluoromethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2-Trichloro-1,2,2-trifluoroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Carbon Disulfide	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl Acetate	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methylene Chloride	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
trans-1,2-Dichloroethene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl-tert-butyl ether	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
cis-1,2-Dichloroethene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Butanone	10 U	10 U	10 U	14	10 U	10 U	10 U	10 U
Bromochloromethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloroform	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	2.3 J	2.8 J
1,1,1-Trichloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Cyclohexane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Carbon Tetrachloride	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,4-Dioxane	100 R	100 R	100 R	100 R	100 R	100 R	100 R	100 R
Trichloroethene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methylcyclohexane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloropropane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromodichloromethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
cis-1,3-Dichloropropene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-Pentanone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Toluene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
trans-1,3-Dichloropropene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2-Trichloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Tetrachloroethene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Hexanone	10 U	10 U	10 U	2.3 J	10 U	10 U	10 U	10 U
Dibromochloromethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dibromoethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Ethylbenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
m,p-Xylene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
o-Xylene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Styrene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromoform	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Isopropylbenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2,2-Tetrachloroethane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,3-Dichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,4-Dichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dibromo-3-Chloropropane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2,4-Trichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2,3-Trichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U

ug/L - micrograms per liter
U - Contaminant not detected
UJ - Contaminant not detected
R - Rejected
J - Estimated concentration
Note - sample depths presented in feet below ground surface
Shading indicates a positive detection

REFERENCE 14

SAMPLING TRIP REPORT

SITE NAME: Wallace International
DCN NO.: SAT2.20113.053.332
W.O. NO.: 20113.011.001.0053.00
CASE NO.: 36113

EPA I.D. NO.: PRN000206029

SAMPLING DATES: January 22 through 24, 2007

1. Site Location: Refer to Figure 1

2. Sample Locations: Refer to Figures 2 and 3

3. Sample Descriptions: Refer to Table 1

4. Laboratories Receiving Samples:

Analysis	Name and Address of Laboratory
Target Compound List (TCL) Volatile Organic Compounds (VOCs), Percent Moisture	Mitkem Corporation 175 Metro Center Boulevard Warwick, RI 02886
Target Analyte List (TAL) Inorganics (including mercury)	ChemTech Consulting Group 284 Sheffield Street Mountainside, NJ 07092

5. Sample Dispatch Data:

Five aqueous samples and nine soil samples for TCL VOC analysis (low-medium concentration) were shipped to Mitkem Corporation, Warwick, RI on 1/22/2007 at 1830 hours via Federal Express (International Air Waybill No. 8392 8685 4266).

Four aqueous samples and nine soil samples for TAL Inorganic (including mercury) analysis (low-medium concentration) were shipped to ChemTech Consulting Group, Mountainside, NJ on 1/22/2007 at 1830 hours via Federal Express (International Air Waybill No. 8392 8685 4288).

Eight aqueous samples and eleven soil samples for TCL VOC analysis (low-medium concentration) were shipped to Mitkem Corporation, Warwick, RI on 1/23/2007 at 1830 hours via Federal Express (International Air Waybill No. 8392 8685 4277).

Seven aqueous samples and eleven soil samples for TAL Inorganic (including mercury) analysis (low-medium concentration) were shipped to ChemTech Consulting Group, Mountainside, NJ on 1/23/2007 at 1830 hours via Federal Express (International Air Way Bill No. 8392 8685 4299).

Five aqueous samples and twelve soil samples for TCL VOC analysis (low-medium concentration) were shipped to Mitkem Corporation, Warwick, RI on 1/24/2007 at 1830 hours via Federal Express (International Air Waybill No. 8392 8685 3650).

Four aqueous samples and twelve soil samples for TAL Inorganic (including mercury) analysis (low-medium concentration) were shipped to ChemTech Consulting Group, Mountainside, NJ on 1/24/2007 at 1830 hours via Federal Express (International Air Waybill No. 8392 8685 3660).

6. On-Site Personnel:

Name	Company	Duties on Site
Dennis Foerter	Weston	Project Manager, Site Health and Safety Officer (SHSO), Sampler
Scott Snyder	Weston	Sample Management Officer (SMO)
Thomas Brownell	Weston	Site Geologist, Geoprobe oversight, Sampler
Julissa Morales	Weston	Sampler, Global Positioning System (GPS) Data Collection
Juan Negron	GeoEnvirotech, Inc.	Geoprobe™ Operator
William Rodriguez	GeoEnvirotech, Inc.	Geoprobe™ Operator
Abraham Nunez	GeoEnvirotech, Inc.	Geoprobe™ Assistant

7. Additional Comments:

From June 22 through 24, 2007, Weston Solutions, Inc. (Weston®) Region 2 Site Assessment Team 2 (SAT 2) personnel conducted a sampling event at the Wallace International (Wallace) site. SAT 2 collected surface soil, subsurface soil, and groundwater samples to determine the priority for further action for this site under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

A total of 18 surface soil (including one duplicate sample), 14 subsurface soil (including one duplicate sample), and 12 groundwater (including one duplicate sample) samples were collected throughout the site. Surface and subsurface soil samples were collected from soil borings advanced using Geoprobe™ direct-push technology. Surface soil samples were collected from the 0- to 2-foot interval below ground surface (bgs). Soil borings were screened every 2 feet using a photoionization detector (PID). Subsurface soil sampling depths were determined based upon PID readings, visual observation, and Geoprobe™ refusal. If there were no elevated organic vapor concentrations, visual signs of contamination, or Geoprobe™ refusal, subsurface soil samples were collected at the interval immediately above groundwater. Surface soil samples were also collected in locations that were not accessible by the Geoprobe™ rig. SAT 2 had planned to collect a groundwater sample from the inactive production well on site, but was unable to collect the sample because the well is out of operation.

Soil samples were collected using dedicated En Core™ sampling devices, disposable plastic scoops, and aluminum trays. One rinsate blank (plastic scoop, aluminum tray, and a decontaminated

Geoprobe™ cutting shoe) was collected on each day of sampling. Trip blank samples were collected in conjunction with groundwater samples.

All samples collected by Weston® were designated for analysis of TCL organics and TAL inorganics (including mercury), through the EPA Contract Laboratory Program (CLP). All sample locations were recorded electronically using GPS technology in accordance with the EPA Region 2 Standard Operating Procedure (SOP). All samples were collected as part of the Expanded Site Inspection (ESI) evaluation conducted on site. Organic and Inorganic Traffic Reports are presented in Attachment 1.

8. Report Prepared by: ______________ Date: 2/1/07
Dennis J. Foerter, CHMM

9. Report Approved by: ______________ Date: 2/1/07
for W. S. Butterfield, CHMM

TABLE 1
SAMPLE DESCRIPTIONS
WALLACE INTERNATIONAL
SAN GERMAN, PUERTO RICO

SAMPLE NUMBER	ORGANIC CLP NO.	INORGANIC CLP NO.	DATE	TIME	COMMENTS
WI-S01	B3RR4	MB3RR4	1/23/07	1120	Surface soil sample adjacent to current drum storage area in the southwestern portion of the current facility. Soil consisted of red-brownish medium to fine sand; depth: 0.5-1 foot (ft.) below ground surface (bgs); Matrix Spike/Matrix Spike Duplicate (MS/MSD) for QA/QC purposes.
WI-SS01	B3RR5	MB3RR5	1/23/07	1132	Subsurface soil sample adjacent to current drum storage area in the southwestern portion of the current facility. Soil consisted of red medium to fine sand, loose and poorly graded; depth: 19.5-20 ft. bgs.
WI-S02	B3RR7	MB3RR7	1/23/07	1215	Surface soil sample adjacent to concrete spillway in the central portion of the current Wallace facility. Soil consisted of crushed stone (gravel) mixed with light gray sand and gravel; depth: 0.5-1 ft. bgs.
WI-SS02	B3RR8	MB3RR8	1/23/07	1405	Subsurface soil sample adjacent to concrete spillway in the central portion of the current Wallace facility. Soil consisted of brownish-yellow silty clay; depth: 13-14 ft. bgs.
WI-SS02A	B3RR9	MB3RR9	1/23/07	1405	Duplicate of sample WI-SS02 for QA/QC purposes.
WI-S03	B3RS2	MB3RS2	1/23/07	0925	Surface soil sample from former TCE drum storage area in the central portion of the current facility. Soil consisted of light-brown compacted sand; depth: 1-2 ft.bgs.
WI-SS03	B3RS3	MB3RS3	1/23/07	1010	Subsurface soil sample from former TCE drum storage area in the central portion of the current facility. Soil consisted of very dense and well-sorted reddish-brown sand; depth: 28-29 ft. bgs.

TABLE 1 (continued)
SAMPLE DESCRIPTIONS
WALLACE INTERNATIONAL
SAN GERMAN, PUERTO RICO

SAMPLE NUMBER	ORGANIC CLP NO.	INORGANIC CLP NO.	DATE	TIME	COMMENTS
WI-S04	B3RS5	MB3RS5	1/22/07	1545	Surface soil sample from a former empty waste oil/trichloroethylene (TCE) drum storage area located in the southwestern portion of the current Wallace facility. Soil consisted of light-brownish-red fine sand and gravel; depth: 0.5-1 ft. bgs.
WI-SS04	B3RS6	MB3RS6	1/22/07	1605	Subsurface soil sample from a former empty waste oil/TCE drum storage area located in the southwestern portion of the current Wallace facility. Soil consisted of medium-coarse poorly graded brownish-red loose sand; depth: 28-28.5 ft. bgs.
WI-S05	B3RS8	MB3RS8	1/23/07	1510	Background surface soil sample from an area suspected not to be influenced by past site activities, south of the current Wallace facility. Light-gray medium to fine loose sand; depth: 0.5-1 ft. bgs.
WI-SS05	B3RS9	MB3RS9	1/23/07	1520	Background subsurface soil sample from an area suspected not to be influenced by past site activities, south of the current Wallace facility. Soil consisted of brownish-red medium to fine sand with trace silt; depth: 12-13 ft. bgs.
WI-S06	B3RT1	MB3RT1	1/23/07	1607	Background surface soil sample from an area suspected not to be influenced by past site activities, south of the current Wallace facility. Light-brown sand; depth: 0.5-1 ft. bgs.
WI-SS06	B3RT2	MB3RT2	1/23/07	1620	Background subsurface soil sample from an area suspected not to be influenced by past site activities, south of the current Wallace facility. Soil consisted of reddish-brown medium to fine moist sand; depth: 19-20 ft. bgs.

TABLE 1 (continued)
SAMPLE DESCRIPTIONS
WALLACE INTERNATIONAL
SAN GERMAN, PUERTO RICO

SAMPLE NUMBER	ORGANIC CLP NO.	INORGANIC CLP NO.	DATE	TIME	COMMENTS
WI-S07	B3RT4	MB3RT4	1/22/07	1220	Surface soil sample north of the current Wallace building; adjacent to Calle B. Soil consisted of loose fine-medium sand mixed with gravel; depth: 0.5-1 ft. bgs.
WI-SS07	B3RT5	MB3RT5	1/22/07	1235	Subsurface soil sample north of the current Wallace building; adjacent to Calle B. Soil consisted of light-brown fine sand mixed with silt; depth: 22.5-23 ft. bgs.
WI-S08	B3RT7	MB3RT7	1/22/07	0945	Surface soil sample north of the current Wallace building at the intersection of Calle A and Calle B. Soil consisted of loose brown sand; depth: 0.5-1 ft. bgs.
WI-SS08	B3RT8	MB3RT8	1/22/07	1000	Subsurface soil sample north of the current Wallace building at the intersection of Calle A and Calle B. Soil consisted of light-brown medium to fine sand; depth: 13.5-14 ft. bgs.
WI-S09	B3RW0	MB3RW0	1/24/07	1620	Background surface soil sample from the previous IO Lab and International Silver de Puerto Rico parcel; collected from an area suspected not to be influenced by past site activities. Soil consisted of light-grayish-brown loose sand and grass; depth: 6-12 inches bgs.
WI-SS09	B3RW1	MB3RW1	1/24/07	1640	Background subsurface soil sample from the previous IO Lab and International Silver de Puerto Rico parcel; collected from an area suspected not to be influenced by past site activities. Soil consisted of light-brown medium sand; depth: 14.5-15 ft. bgs.

TABLE 1 (continued)
SAMPLE DESCRIPTIONS
WALLACE INTERNATIONAL
SAN GERMAN, PUERTO RICO

SAMPLE NUMBER	ORGANIC CLP NO.	INORGANIC CLP NO.	DATE	TIME	COMMENTS
WI-S10	B3RW3	MB3RW3	1/24/07	1510	Surface soil sample adjacent to the northeast corner of the previous IO Lab and International Silver de Puerto Rico building. Soil consisted of light-grayish-brownish loose medium sand and grass; depth: 0.5-1 ft. bgs.
WI-S11	B3RW6	MB3RW6	1/24/07	1415	Surface soil sample adjacent to the eastern corner of the previous IO Lab and International Silver de Puerto Rico building. Soil consisted of dark-brown fine sand, well-compacted; depth: 1.5-2 ft. bgs.
WI-S11A	B3RW7	MB3RW7	1/24/07	1420	Duplicate of surface soil WI-S11 for QA/QC purposes.
WI-SS11	B3RW8	MB3RW8	1/24/07	1550	Subsurface soil sample adjacent to the eastern corner of the previous IO Lab and International Silver de Puerto Rico building. Soil consisted of light-grayish-green dense well-compacted clay; depth: 29-30 ft. bgs; MS/MSD for QA/QC purposes.
WI-S12	B3RX0	MB3RX0	1/24/07	1250	Surface soil sample collected from parking lot of Mr. Special Supermarket to determine potential plume migration from the Wallace facility. Soil consisted of loose light-gray fine sand mixed with crushed gravel; depth: 2-2.5 ft. bgs.
WI-SS12	B3RX1	MB3RX1	1/24/07	1335	Subsurface soil sample collected from parking lot north of the Mr. Special Supermarket to determine potential plume migration from the Wallace facility. Soil consisted of very dry and brittle dust-like clay; very fractured; depth: 33-34 ft. bgs.

TABLE 1 (continued)
SAMPLE DESCRIPTIONS
WALLACE INTERNATIONAL
SAN GERMAN, PUERTO RICO

SAMPLE NUMBER	ORGANIC CLP NO.	INORGANIC CLP NO.	DATE	TIME	COMMENTS
WI-S13	B3RX3	MB3RX3	1/24/07	0805	Surface soil sample from the northeast corner of the previous Wallace facility parcel. Soil consisted of brownish-gray fine sand mixed with grass; depth: 1.5-2 ft. bgs.
WI-SS13	B3RX4	MB3RX4	1/24/07	0939	Subsurface soil sample from the northeast corner of the previous Wallace facility parcel. Soil consisted of brownish silty sand mixed with gravel; depth: 24-25 ft. bgs.
WI-S14	B3RX6	MB3RX6	1/24/07	1010	Surface soil sample from the southeast corner of the previous Wallace facility parcel. Soil consisted of light-brown loose sand mixed with grass; depth: 1.5-2.5 ft. bgs.
WI-SS14	B3RX7	MB3RX7	1/24/07	1125	Subsurface soil sample from the northeast corner of the previous Wallace facility parcel. Soil consisted of light-brown fine sand, well-compacted; depth: 18.5-19 ft. bgs.
WI-S15	B3RX9	MB3RX9	1/22/07	1315	Surface soil sample collected from an area where broken fluorescent bulbs and a half-buried drum were observed. Soil consisted of light-brownish-red fine sand and gravel; 0-0.5 ft. bgs.
WI-S16	B3RY0	MB3RY0	1/22/07	1305	Surface soil sample from an area where an apparent spill was observed in the southwest portion of the current Wallace facility. Soil consisted of light-brownish-red fine sand and gravel; depth: 0-0.5 ft. bgs.
WI-S17	B3RY1	MB3RY1	1/22/07	1325	Surface soil sample from concrete spillway located in the central portion of the current Wallace facility. Soil consisted of light-brown sand and gravel; depth: 0-0.5 ft. bgs.

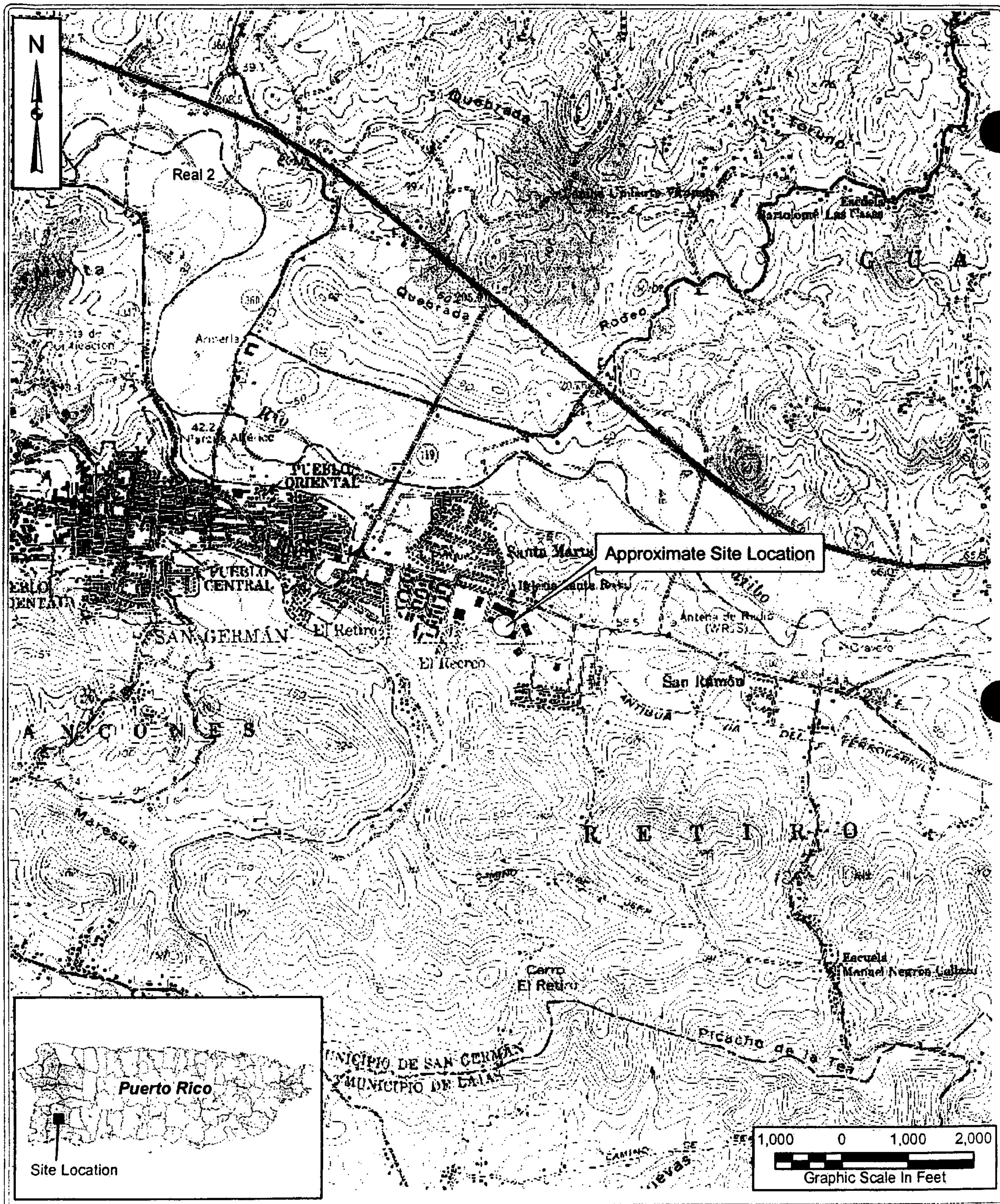
TABLE 1 (continued)
SAMPLE DESCRIPTIONS
WALLACE INTERNATIONAL
SAN GERMAN, PUERTO RICO

SAMPLE NUMBER	ORGANIC CLP NO	INORGANIC CLP NO	DATE	TIME	COMMENTS
WI-GW01	B3RR6	MB3RR6	1/23/07	1120	Groundwater sample adjacent to current drum storage area in the southeastern portion of the current facility; depth: 20 ft. bgs; MS/MSD for QA/QC purposes.
WI-GW02	B3RS0	MB3RS0	1/23/07	1344	Groundwater sample adjacent to concrete spillway in the central portion of the current Wallace facility; depth: 22 ft. bgs.
WI-GW02A	B3RS1	MB3RS1	1/23/07	1344	Duplicate of groundwater sample WI-GW02 for QA/QC purposes.
WI-GW03	B3RS4	MB3RS4	1/23/07	0950	Groundwater sample from former TCE drum storage area in the central portion of the current facility; depth: 29.5 ft. bgs.
WI-GW04	B3RS7	MB3RS7	1/22/07	1545	Groundwater sample in the area of a former empty waste oil/TCE drum storage area located in the southwestern portion of the current Wallace facility; depth: 28.5 ft. bgs.
WI-GW05	B3RT0	MB3RT0	1/23/07	1500	Background groundwater sample from an area suspected not to be influenced by past site activities, south of the current Wallace facility; depth: 29 ft. bgs.
WI-GW06	B3RT3	MB3RT3	1/23/07	1605	Background groundwater sample from an area suspected not to be influenced by past site activities, south of the current Wallace facility; depth: 24 ft. bgs.
WI-GW07	B3RT6	MB3RT6	1/22/07	1210	Groundwater sample north of the current Wallace building; adjacent to Calle B; depth: 23 ft. bgs.
WI-GW08	B3RT9	MB3RT9	1/22/07	0850	Groundwater sample north of the current Wallace building at the intersection of Calle A and Calle B; depth: 14 ft. bgs.

TABLE 1 (continued)
SAMPLE DESCRIPTIONS
WALLACE INTERNATIONAL
SAN GERMAN, PUERTO RICO

SAMPLE NUMBER	ORGANIC CLP NO.	INORGANIC CLP NO.	DATE	TIME	COMMENTS
WI-GW09	B3RW2	MB3RW2	1/24/07	1620	Background groundwater sample from the previous IO Lab and International Silver de Puerto Rico parcel; collected from an area suspected not to be influenced by past site activities; depth: 15 ft. bgs.
WI-GW13	B3RX5	MB3RX5	1/24/07	0930	Groundwater sample from the northeast corner of the previous Wallace facility parcel; depth: 32 ft. bgs.
WI-GW14	B3RX8	MB3RX8	1/24/07	1120	Groundwater sample from the northeast corner of the previous Wallace facility parcel; depth: 32 ft. bgs.
WI-RIN01	B3RY3	MB3RY3	1/22/07	1045	Rinsate Blank (Geoprobe™ cutting shoe, disposable plastic scoop, and aluminum tr[illegible] for Quality Assurance / Quality Control (QA/QC) purposes
WI-RIN02	B3RY4	MB3RY4	1/23/07	1440	Rinsate Blank (Geoprobe™ cutting shoe, disposable plastic scoop, and aluminum tray) for QA/QC purposes.
WI-RIN03	B3RY5	MB3RY5	1/24/07	1525	Rinsate Blank (Geoprobe™ cutting shoe, disposable plastic scoop, and aluminum tray) for QA/QC purposes
WI-TB01	B3RY6	NA	1/22/07	0840	Trip blank for QA/QC purposes.
WI-TB02	B3RY7	NA	1/23/07	0945	Trip blank for QA/QC purposes.
WI-TB03	B3RY8	NA	1/24/07	0900	Trip blank for QA/QC purposes.

SITE LOCATION AND SAMPLE LOCATION MAPS



LEGEND

◯ Approximate Site Location

7.5 Minute Series Topographic Quadrangle: San German, PR.

PROJECT

Wallace International

CLIENT NAME

EPA

TITLE

Site Location Map
Wallace International
San German, PR

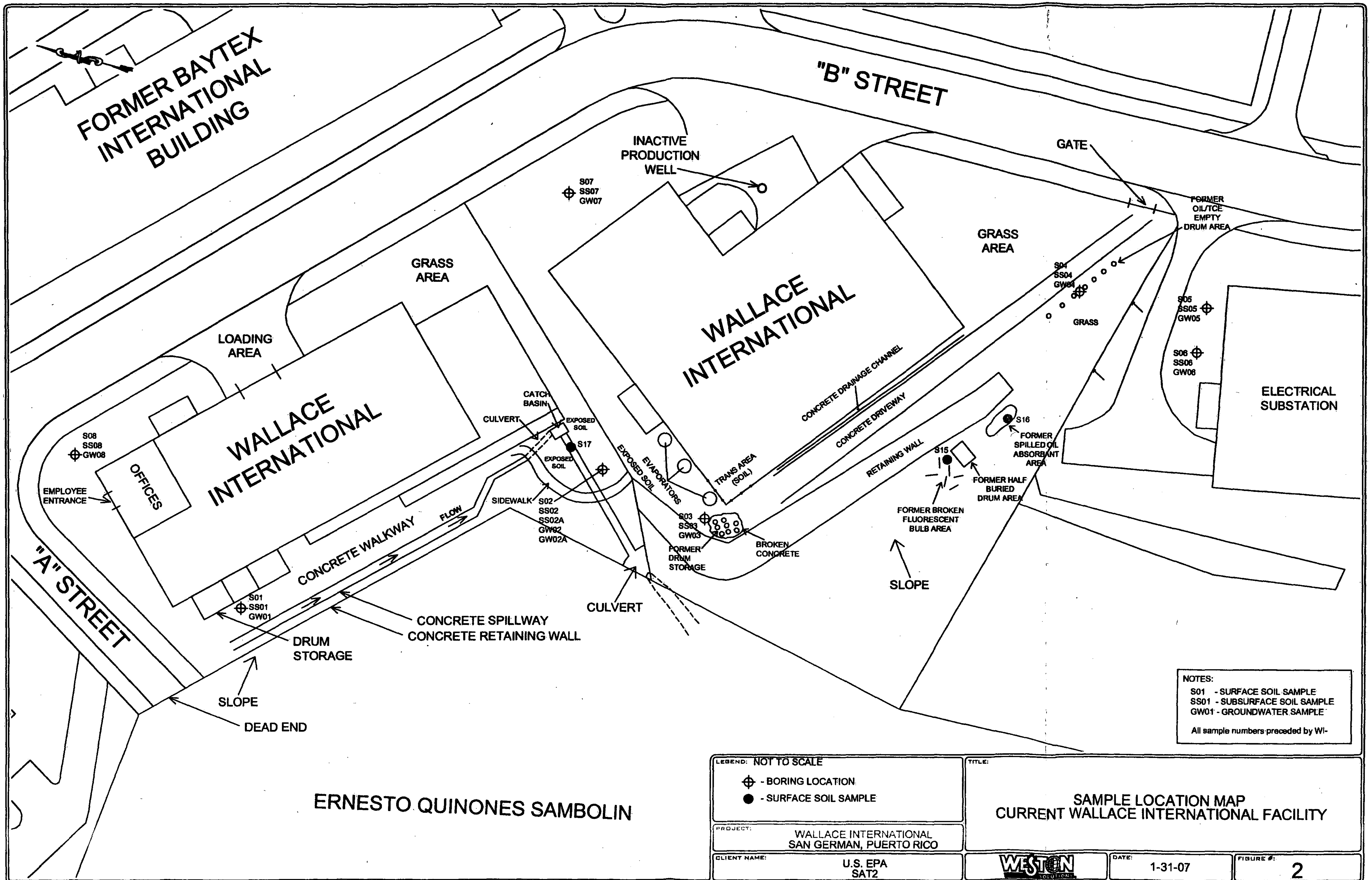
12

DATE

11/07/2006

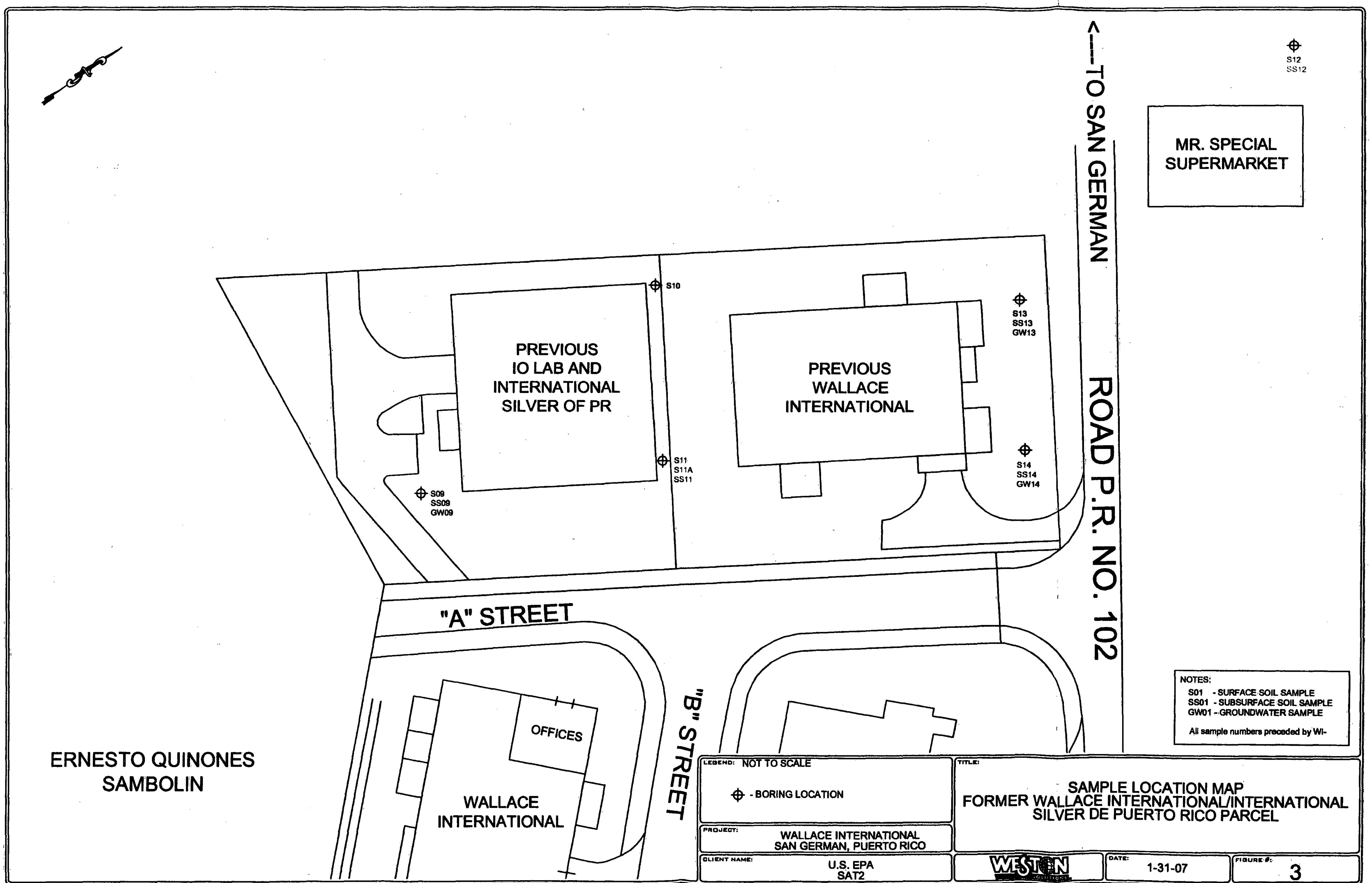
FIGURE #

1



P:\EPA\Wallace\GIS\CAD\0107_Siteplan\04046_Samp_Loc.dwg

13



P:\EPA\Wallace\GIS\CAD\0107_Siteplan\04047_Samp_Loc.dwg

(14)

ATTACHMENT 1

TRAFFIC REPORTS/CHAIN OF CUSTODY RECORDS/
FEDEX AIRBILLS

EPA **USEPA Contract Laboratory Program**
Organic Traffic Report & Chain of Custody Record

Case No: 36113 **R**
DAS No:

Region: 2
Project Code:
Account Code:
CERCLIS ID:
Spill ID:
Site Name/State: Wallace International/PR
Project Leader: Dennis Foerter
Action: Preliminary Assessment/Site Inspection (PA/SI)
Sampling Co: Weston - SAT 2

Date Shipped: 1/22/2007
Carrier Name: FedEx
Airbill: 8392 8685 4266
Shipped to: Mitkem Corporation
175 Metro Center Blvd.
Warwick RI 02886
(401) 732-3400

Chain of Custody Record
Sampler Signature:

Relinquished By	(Date / Time)	Received By	(Date / Time)
1	1/22/07 1530	FedEx	1/22/07 1830
2			
3			
4			

ORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME	INORGANIC SAMPLE No.	QC Type
B3RS5	Soil (0"-24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-S04	S: 1/22/2007 15:45	MB3RS5	--
B3RS6	Soil (>24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-SS04	S: 1/22/2007 16:05	MB3RS6	--
B3RS7	Ground Water/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	WI-GW04	S: 1/22/2007 15:45	MB3RS7	--
B3RT4	Soil (0"-24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-S07	S: 1/22/2007 12:20	MB3RT4	--
B3RT5	Soil (>24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-SS07	S: 1/22/2007 12:35	MB3RT5	--
B3RT6	Ground Water/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	WI-GW07	S: 1/22/2007 12:10	MB3RT6	--
B3RT7	Soil (0"-24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-S08	S: 1/22/2007 9:45	MB3RT7	--
B3RT8	Soil (>24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-SS08	S: 1/22/2007 10:00	MB3RT8	--
B3RT9	Ground Water/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	WI-GW08	S: 1/22/2007 8:50	MB3RT9	--
B3RX9	Soil (0"-24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-S15	S: 1/22/2007 13:15	MB3RX9	--
B3RY0	Soil (0"-24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-S16	S: 1/22/2007 13:05	MB3RY0	--

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment Iced?

% Moisture = TCL Percent Moisture (soil), TCL VOCs = TCL VOCs (soil), VOC (aq) = TCL VOCs (aqueous)

TR Number: 2-291174636-012207-0001

REGION COPY

PR provides preliminary results. Requests for preliminary results will increase analytical costs.
Send Copy to: Sample Management Office Attn: Mike Benhoff, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Ph 703/818-4200; Fax 703/818-4602

USEPA Contract Laboratory Program
Organic Traffic Report & Chain of Custody Record

Case No: 36113
DAS No:

R

Region:	2	**Date Shipped:**	1/22/2007
Project Code:		**Carrier Name:**	FedEx
Account Code:		**Airbill:**	8392 8685 4266
CERCLIS ID:		**Shipped to:**	Mitkem Corporation 175 Metro Center Blvd. Warwick RI 02886 (401) 732-3400
Spill ID:			
Site Name/State:	Wallace International/PR		
Project Leader:	Dennis Foerter		
Action:	Preliminary Assessment/Site Inspection (PA/SI)		
Sampling Co:	Weston - SAT 2		

Chain of Custody Record — **Sampler Signature:** [signature]

	Relinquished By (Date / Time)	Received By (Date / Time)
1	[signature] 1/22/07 1930	FedEx 1/22/07 1930
2		
3		
4		

ORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME	INORGANIC SAMPLE No.	QC Type
B3RY1	Soil (0"-24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-S17	S: 1/22/2007 13:25	MB3RY1	--
B3RY3	Field QC/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	WI-RIN01	S: 1/22/2007 10:45	MB3RY3	Rinsate
B3RY6	Field QC/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	WI-TB01	S: 1/22/2007 8:40		Trip Blank

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** ________

% Moisture = TCL Percent Moisture (soil), TCL VOCs = TCL VOCs (soil), VOC (aq) = TCL VOCs (aqueous)

TR Number: 2-291174636-012207-0001

REGION COPY

PR provides preliminary results. Requests for preliminary results will increase analytical costs.

Send Copy to: Sample Management Office Attn: Mike Benhoff, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Ph 703/818-4200; Fax 703/818-4602

FedEx Express **International Air Waybill**
For FedEx services worldwide

Sender's Copy

1 From Please print and press hard.

Date 01/22/07 Sender's FedEx Account Number 1080-6769-1

Sender's Name Scott Snyder Phone (732)406-8640

Company Weston Solutions

Address c/o Mayaguez Resort

Address Rt. 104, Km 0.3

City Mayaguez State Province PR

Country Puerto Rico ZIP Postal Code 00680

2 To

Recipient's Name Nathan Reynolds Phone (401)732-3400

Company Mitkem Corporation

Address 175 Metro Center Blvd Dept/Floor

Address

City Warwick State Province RI

Country USA ZIP Postal Code 02886

Recipient's Tax I.D. number for Customs purposes
e.g. GST/RFC/VAT/IN/EIN, or as locally required

3 Shipment Information ☐ For EU Only: Tick here if goods are not in free circulation and provide C.I.

Total Packages (Shipper's Load and Count/SLAC) 1 Total Weight 45.65 lbs. ☒ kg ☐ DIM 21 / 16 / 13 in. ☒ cm ☐

Commodity Description REQUIRED	Harmonized Code	Country of Manufacture	Value for Customs REQUIRED
Environmental Samples		USA	500 -

For U.S. Export only: Check One
☐ No SED required per Exemption
☐ No SED required, value $2500 or less per Schedule B Commodity number
☐ SED attached (provide export license no. and exp. date or license exception symbol, w/ECCN if applicable)

Total Declared Value for Carriage 500 -

Total Value for Customs (Specify Currency) 500 - USD

4 Express Package Service

Packages up to 150 lbs. / 68 kg For packages over 150 lbs. (68 kg), use the FedEx Expanded Service Intl. Air Waybill.

Not all services and options are available to all destinations.

☒ FedEx Intl. Priority
☐ FedEx Intl. First — Available to select locations. Higher rates apply.
☐
☐ FedEx Intl. Economy — FedEx Envelope and FedEx Pak rate not available.

5 Packaging

These unique brown boxes with special pricing are provided by FedEx for FedEx Intl. Priority only.

☐ FedEx Envelope ☐ FedEx Pak ☐ FedEx 10kg Box ☐ FedEx 25kg Box ☒ Other

6 Special Handling

☐ HOLD at FedEx Location
☐ SATURDAY Delivery — Available to select locations. Available for FedEx Intl. Priority only.

7a Payment *Bill transportation charges to:*

☒ Sender Acct. No. in Section 1 will be billed.
Enter FedEx Acct. No. or Credit Card No. below.
☐ Recipient ☒ Third Party ☐ Credit Card ☐ Cash Check/Cheque

FedEx Acct. No. 1080-6769-1 FedEx Use Only

Credit Card No.

Credit Card Exp. Date

7b Payment *Bill duties and taxes to:* ALL shipments can be subject to Customs charges, which FedEx does not estimate prior to clearance.

☒ Sender Acct. No. in Section 1 will be billed.
Enter FedEx Acct. No. below.
☐ Recipient ☐ Third Party

FedEx Acct. No.

8 Your Internal Billing Reference First 24 characters will appear on invoice.

20113.011.001.0053.00

9 Required Signature

Use of this Air Waybill constitutes your agreement to the Conditions of Contract on the back of this Air Waybill, and you represent that this shipment does not require a U.S. State Department License or contain Dangerous Goods. Certain international treaties, including the Warsaw Convention, may apply to this shipment and limit our liability for damage, loss, or delays as described in the Conditions of Contract. WARNING: These commodities, technology, or software were exported from the United States in accordance with Export Administration Regulations. Diversion contrary to U.S. law prohibited.

Sender's Signature: Date Executed: 1/22/07

This is not authorization to deliver this shipment without a recipient signature.

For Completion Instructions, see back of fifth page.

FedEx Tracking Number 8392 8685 4266 Form I.D. No. 0402

464

PART 157593 Rev. Date 10/01 ©1994-2001 FedEx PRINTED IN U.S.A.

Try online shipping at fedex.com

Questions? Visit our Web site at fedex.com.
Or in the U.S., call 800.247.4747. Outside the U.S., call your local FedEx office.

RETAIN THIS COPY FOR YOUR RECORDS

(8)

USEPA Contract Laboratory Program
Inorganic Traffic Report & Chain of Custody Record

Case No: 36113

DAS No:

R

Region:	2
Project Code:	
Account Code:	
CERCLIS ID:	
Spill ID:	
Site Name/State:	Wallace International/PR
Project Leader:	Dennis Foerter
Action:	Preliminary Assessment/Site Inspection (PA/SI)
Sampling Co:	Weston - SAT 2

Date Shipped:	1/22/2007
Carrier Name:	FedEx
Airbill:	8392 8685 4288
Shipped to:	ChemTech Consulting Group (CHEM) ~~110 Route 4 Englewood NJ 07631 (201) 568-7400~~

(908) 789-8900 284 Sheffield St Mountainside, NJ 07092 1/22/07

Chain of Custody Record

Sampler Signature:

	Relinquished By	(Date / Time)	Received By	(Date / Time)
1		1/17/07 1830	Fed Ex	1/22/07 1830
2				
3				
4				

INORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME	ORGANIC SAMPLE No.	QC Type
MB3RS5	Soil (0"-24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-S04	S: 1/22/2007 15:45	B3RS5	–
MB3RS6	Soil (>24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-SS04	S: 1/22/2007 16:05	B3RS6	–
MB3RT4	Soil (0"-24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-S07	S: 1/22/2007 12:20	B3RT4	–
MB3RT5	Soil (>24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-SS07	S: 1/22/2007 12:35	B3RT5	–
MB3RT6	Ground Water/ Scott Snyder	M/G	In/Hg (aq) (7)	(HNO3) (1)	WI-GW07	S: 1/22/2007 12:10	B3RT6	–
MB3RT7	Soil (0"-24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-S08	S: 1/22/2007 9:45	B3RT7	–
MB3RT8	Soil (>24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-SS08	S: 1/22/2007 10:00	B3RT8	–
MB3RT9	Ground Water/ Scott Snyder	M/G	In/Hg (aq) (7)	(HNO3) (1)	WI-GW08	S: 1/22/2007 8:50	B3RT9	–
MB3RX9	Soil (0"-24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-S15	S: 1/22/2007 13:15	B3RX9	–
MB3RY0	Soil (0"-24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-S16	S: 1/22/2007 13:05	B3RY0	–
MB3RY1	Soil (0"-24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-S17	S: 1/22/2007 13:25	B3RY1	–

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment Iced?

In/Hg (aq) = TAL Inorganics/Mercury (aqueous), Inorg/Hg = TAL Inorganics/Mercury (soil)

TR Number: 2-291174636-012207-0002

REGION COPY

PR provides preliminary results. Requests for preliminary results will increase analytical costs.

Send Copy to: Sample Management Office Attn: Mike Benhoff, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Ph 703/818-4200; Fax 703/818-4602

EPA **USEPA Contract Laboratory Program**
Inorganic Traffic Report & Chain of Custody Record

Case No: 36113
DAS No:

R

Region:	2	Date Shipped:	1/22/2007
Project Code:		Carrier Name:	FedEx
Account Code:		Airbill:	8392 8685 4288
CERCLIS ID:		Shipped to:	ChemTech Consulting Group (CHEM) ~~140 Route 4 Englewood NJ 07631 (201) 568-7400~~ (908) 789-8900 284 Sheffield St Mountainside, NJ 07092 SS 1/22/07
Spill ID:			
Site Name/State:	Wallace International/PR		
Project Leader:	Dennis Foerter		
Action:	Preliminary Assessment/Site Inspection (PA/SI)		
Sampling Co:	Weston - SAT 2		

Chain of Custody Record

Sampler Signature:

	Relinquished By	(Date / Time)	Received By	(Date / Time)
1		1/22/07 1830	FedEx	1/22/07 1830
2				
3				
4				

INORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME	ORGANIC SAMPLE No.	QC Type
MB3RY3	Field QC/ Scott Snyder	M/G	In/Hg (aq) (7)	(HNO3) (1)	WI-RIN01	S: 1/22/2007 10:45	B3RY3	Rinsate
MB3RS7	Groundwater/ Scott Snyder	M/G	In/Hg (aq) 7	HNO3 (1)	WI-GW04	S: 1/22/2007 15:45	B3RS7	

20) SS 1/22/07

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment Iced?

In/Hg (aq) = TAL Inorganics/Mercury (aqueous), Inorg/Hg = TAL Inorganics/Mercury (soil)

TR Numb[illegible] 2-291174636-012207-0002

REGION C[illegible]PY

PR provides prel[illegible]y results. Requests for preliminary results will increase analytical costs.

Send Copy to: S[illegible]le Management Office Attn: Mike Benhoff, CSC, 15000 Conference Center Dr., Ch[illegible]ly, VA 20151-3819; Ph 703/818-4200; Fax 703/818-4602

(2)

FedEx Express International Air Waybill

For FedEx services worldwide

Sender's Copy

1 From
Please print and press hard.

Date 01/22/07 Sender's FedEx Account Number 1080-6769-1

Sender's Name Scott Snyder Phone (732)406-8640

Company Weston Solutions, Inc.

Address c/o Mayaguez Resort

Address Rt 104, Km 0.3

City Mayaguez State/Province PR

Country Puerto Rico ZIP/Postal Code 00680

2 To

Recipient's Name Parveen Hasan Phone (908)789-8900

Company ChemTech Consulting

Address 284 Sheffield St. Dept./Floor

Address

City Mountainside State/Province NJ

Country USA ZIP/Postal Code 07092

Recipient's Tax I.D. number for Customs purposes
e.g., GST/RFC/VAT/IN/EIN, or as locally required

3 Shipment Information

☐ For EU Only: Tick here if goods are not in free circulation and provide C.I.

Total Packages (Shipper's Load and Count/SLAC) 1 Total Weight 57.55 ☒ lbs. ☐ kg DIM 21 16 13 ☒ in. ☐ cm

Commodity Description REQUIRED	Harmonized Code	Country of Manufacture	Value for Customs REQUIRED
Environmental Samples		USA	500

For U.S. Export Only: Check One
☐ No SED required per Exemption
☐ No SED required, value $2500 or less per Schedule B Commodity number
☐ SED attached (provide export license no. and exp. date or license exception symbol, w/ECCN # applicable)

Total Declared Value for Carriage 500

Total Value for Customs (Specify Currency) 500 USD

4 Express Package Service

Packages up to 150 lbs. / 68 kg
For packages over 150 lbs. (68 kg), use the FedEx Expanded Service Intl. Air Waybill.

Not all services and options are available to all destinations.

☒ FedEx Intl. Priority
☐ FedEx Intl. First — Available to select locations. Higher rates apply.
☐
☐ FedEx Intl. Economy — FedEx Envelope and FedEx Pak rate not available

5 Packaging

These unique brown boxes with special pricing are provided by FedEx for FedEx Intl. Priority only.

☐ FedEx Envelope ☐ FedEx Pak ☐ FedEx 10kg Box ☐ FedEx 25kg Box ☒ Other

6 Special Handling

☐ HOLD at FedEx Location
☐ SATURDAY Delivery — Available to select locations. Available for FedEx Intl. Priority only

7a Payment *Bill transportation charges to:*

☒ Sender Acct. No. in Section 1 will be billed.
Enter FedEx Acct. No. or Credit Card No. below.
☐ Recipient ☒ Third Party ☐ Credit Card ☐ Cash Check/Cheque

FedEx Acct. No. 1080-6769-1 FedEx Use Only

Credit Card No.

Credit Card Exp. Date

7b Payment *Bill duties and taxes to:*

All shipments can be subject to Customs charges, which FedEx does not estimate prior to clearance.

☒ Sender Acct. No. in Section 1 will be billed.
Enter FedEx Acct. No. below.
☐ Recipient ☒ Third Party

FedEx Acct. No.

8 Your Internal Billing Reference

First 24 characters will appear on invoice.

OPTIONAL 20113.011.0[illegible].6053.00

9 Required Signature

Use of this Air Waybill constitutes your agreement to the Conditions of Contract on the back of this Air Waybill, and you represent that this shipment does not require a U.S. State Department License or contain Dangerous Goods. Certain international treaties, including the Warsaw Convention, may apply to this shipment and limit our liability for damage, loss, or delay, as described in the Conditions of Contract.
WARNING: These commodities, technology, or software were exported from the United States in accordance with Export Administration Regulations. Diversion contrary to U.S. law prohibited.

Sender's Signature: [signature] Date Executed: 1/22/07

This is not authorization to deliver this shipment without a recipient signature.

For Completion Instructions, see back of fifth page.

FedEx Tracking Number 8392 8685 4288

Form I.D. No. 0402

464

PART 157580 Rev. Date 10/01 ©1994-2001 FedEx PRINTED IN U.S.A.

Try online shipping at fedex.com

The terms and conditions of service may vary from country to country. Consult our local office for specific information.
Non-Negotiable International Air Waybill • ©1994-2001 Federal Express Corporation

Questions? Visit our Web site at fedex.com.
Or in the U.S., call 800.247.4747. Outside the U.S., call your local FedEx office.

RETAIN THIS COPY FOR YOUR RECORDS

EPA USEPA Contract Laboratory Program
Organic Traffic Report & Chain of Custody Record

Case No: 36113 **R**
DAS No:

Region:	2
Project Code:	
Account Code:	
CERCLIS ID:	
Spill ID:	
Site Name/State:	Wallace International/PR
Project Leader:	Dennis Foerter
Action:	Preliminary Assessment/Site Inspection (PA/SI)
Sampling Co:	Weston - SAT 2

Date Shipped:	1/23/2007
Carrier Name:	FedEx
Airbill:	8392 8685 4277
Shipped to:	Mitkem Corporation 175 Metro Center Blvd. Warwick RI 02886 (401) 732-3400

Chain of Custody Record

Sampler Signature:

	Relinquished By	(Date / Time)	Received By	(Date / Time)
1		1/23/07 1830	FedEx	1/23/07 1830
2				
3				
4				

ORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME	INORGANIC SAMPLE No.	QC Type
B3RR4	Soil (0"-24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-S01	S: 1/23/2007 11:20	MB3RR4	--
B3RR5	Soil (>24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-SS01	S: 1/23/2007 11:32	MB3RR5	--
B3RR6	Ground Water/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	WI-GW01	S: 1/23/2007 11:20	MB3RR6	--
B3RR7	Soil (0"-24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-S02	S: 1/23/2007 12:15	MB3RR7	--
B3RR8	Soil (>24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-SS02	S: 1/23/2007 14:05	MB3RR8	--
B3RR9	Soil (>24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-SS02A	S: 1/23/2007 14:05	MB3RR9	Field Duplicate
B3RS0	Ground Water/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	WI-GW02	S: 1/23/2007 13:44	MB3RS0	--
B3RS1	Ground Water/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	WI-GW02A	S: 1/23/2007 13:44	MB3RS1	Field Duplicate
B3RS2	Soil (0"-24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-S03	S: 1/23/2007 9:25	MB3RS2	--
B3RS3	Soil (>24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-SS03	S: 1/23/2007 10:10	MB3RS3	--
B3RS4	Ground Water/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	WI-GW03	S: 1/23/2007 9:50	MB3RS4	--

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC: B3RR4, B3RR6	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** ______

% Moisture = TCL Percent Moisture (soil), TCL VOCs = TCL VOCs (soil), VOC (aq) = TCL VOCs (aqueous)

TR Number: 2-291174636-012307-0003

REGION COPY

PR provides pr ry results. Requests for preliminary results will increase analytical costs.
Send Copy to: le Management Office Attn: Mike Benhoff, CSC, 15000 Conference Center Dr., C lly, VA 20151-3819; Ph 703/818-4200; Fax 703/818-4602

USEPA Contract Laboratory Program
Organic Traffic Report & Chain of Custody Record

Case No: 36113
DAS No:

R

Region: 2
Project Code:
Account Code:
CERCLIS ID:
Spill ID:
Site Name/State: Wallace International/PR
Project Leader: Dennis Foerter
Action: Preliminary Assessment/Site Inspection (PA/SI)
Sampling Co: Weston - SAT 2

Date Shipped: 1/23/2007
Carrier Name: FedEx
Airbill: 8392 8685 4277
Shipped to: Mitkem Corporation
175 Metro Center Blvd.
Warwick RI 02886
(401) 732-3400

Chain of Custody Record

Sampler Signature:

	Relinquished By	(Date / Time)	Received By	(Date / Time)
1		1/23/07 1830	FedEx	1/23/07 1830
2				
3				
4				

ORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		INORGANIC SAMPLE No.	QC Type
B3RS8	Soil (0"-24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-S05	S: 1/23/2007	15:10	MB3RS8	--
B3RS9	Soil (>24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-SS05	S: 1/23/2007	15:20	MB3RS9	--
B3RT0	Ground Water/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	WI-GW05	S: 1/23/2007	15:00	MB3RT0	--
B3RT1	Soil (0"-24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-S06	S: 1/23/2007	16:07	MB3RT1	--
B3RT2	Soil (>24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-SS06	S: 1/23/2007	16:20	MB3RT2	--
B3RT3	Ground Water/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	WI-GW06	S: 1/23/2007	16:05	MB3RT3	--
B3RY4	Field QC/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	WI-RIN02	S: 1/23/2007	14:40	MB3RY4	Rinsate
B3RY7	Field QC/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	WI-TB02	S: 1/23/2007	9:45		Trip Blank

23

Shipment for Case Complete? N

Sample(s) to be used for laboratory QC: B3RR4, B3RR6

Additional Sampler Signature(s):

Chain of Custody Seal Number:

Analysis Key: Concentration: L = Low, M = Low/Medium, H = High Type/Designate: Composite = C, Grab = G Shipment Iced? ________

% Moisture = TCL Percent Moisture (soil), TCL VOCs = TCL VOCs (soil), VOC (aq) = TCL VOCs (aqueous)

TR Number: 2-291174636-012307-0003

REGION COPY

PR provides preliminary results. Requests for preliminary results will increase analytical costs.

Send Copy to: Sample Management Office Attn: Mike Benhoff, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Ph 703/818-4200; Fax 703/818-4602

24

FedEx Express International Air Waybill

For FedEx services worldwide

Sender's Copy

1 From *Please print and press hard*

Date 01/23/07 Sender's FedEx Account Number 1080-6769-1

Sender's Name Scott Snyder Phone (732)406-8640

Company Weston Solutions, Inc.

Address c/o Mayaguez Resort

Address Route 104, Km 0.3

City Mayaguez State Province PR

Country Puerto Rico ZIP Postal Code 00680

2 To

Recipient's Name Nathan Reynolds Phone (401)732-3400

Company Mitkem Corporation

Address 175 Metro Center Blvd Dept./Floor

Address

City Warwick State Province RI

Country USA ZIP Postal Code 02886

Recipient's Tax I.D. number for Customs purposes
e.g., GST/RFC/VAT/IN/EIN, or as locally required

3 Shipment Information ☐ For EU Only: Tick here if goods are not in free circulation and provide C.I.

Total Packages (Shipper's Load and Count/SLAC) 1 Total Weight 50.17 lbs. ☒ kg ☐ DIM 21 / 15 / 14 in. ☐ cm ☐

Commodity Description REQUIRED	Harmonized Code	Country of Manufacture	Value for Customs REQUIRED
Environmental Samples		USA	500-

Export License / No SED required per Exemption ☐ No SED required, value $2500 or less per Schedule B Commodity number — Total Declared Value for Carriage 500- — Total Value for Customs (Specify Currency) 500- USD

☐ SED attached (provide export license no. and exp. date or license exception symbol, w/ECCN if applicable)

4 Express Package Service *Packages up to 150 lbs./68 kg* *For packages over 150 lbs. (68 kg), use the FedEx Expanded Service Intl. Air Waybill.*

Not all services and options are available to all destinations.

☒ FedEx Intl. Priority ☐ FedEx Intl. First (Available to select locations. Higher rates apply.)

☐ ______ ☐ FedEx Intl. Economy (FedEx Envelope and FedEx Pak rate not available)

5 Packaging (These unique brown boxes with special pricing are provided by FedEx for FedEx Intl. Priority only.)

☐ FedEx Envelope ☐ FedEx Pak ☐ FedEx 10kg Box ☐ FedEx 25kg Box ☒ Other

6 Special Handling

☐ HOLD at FedEx Location ☐ SATURDAY Delivery (Available to select locations. Available for FedEx Intl. Priority only)

7a Payment *Bill transportation charges to:*

☒ Sender (Acct. No. in Section 1 will be billed.) — Enter FedEx Acct. No. or Credit Card No. below. — ☐ Recipient ☒ Third Party ☐ Credit Card ☐ Cash Check/Cheque

FedEx Acct. No. 1080-6769-1 FedEx Use Only

Credit Card No.

Credit Card Exp. Date

7b Payment *Bill duties and taxes to:* ALL shipments can be subject to Customs charges, which FedEx does not estimate prior to clearance.

☒ Sender (Acct. No. in Section 1 will be billed.) — Enter FedEx Acct. No. below. — ☐ Recipient ☒ Third Party

FedEx Acct. No. 1080-6769-1

8 Your Internal Billing Reference First 24 characters will appear on invoice.

20113.011.0[illegible]053.00

9 Required Signature

Use of this Air Waybill constitutes your agreement to the Conditions of Contract on the back of this Air Waybill, and you represent that this shipment does not require a U.S. State Department License or contain Dangerous Goods. Certain international treaties, including the Warsaw Convention, may apply to this shipment and limit our liability for damage, loss, or delay, as described in the Conditions of Contract. WARNING: These commodities, technology, or software were exported from the United States in accordance with Export Administration Regulations. Diversion contrary to U.S. law prohibited.

Sender's Signature: [signature] Date Executed: 1/23/07

This is not authorization to deliver this shipment without a recipient signature.

For Completion Instructions, see back of fifth page.

FedEx Tracking Number 8392 8685 4277 Form I.D. No. 0402

464

PART 157893 Rev. Date 10/01 ©1994-2001 FedEx PRINTED IN U.S.A.

RETAIN THIS COPY FOR YOUR RECORDS

Try online shipping at fedex.com

Questions? Visit our Web site at fedex.com.

Or in the U.S., call 800.247.4747. Outside the U.S., call your local FedEx office.

USEPA Contract Laboratory Program
Inorganic Traffic Report & Chain of Custody Record

Case No: 36113 **R**
DAS No:

Region: 2	**Date Shipped:** 1/23/2007	**Chain of Custody Record**		**Sampler Signature:** [signature]	
Project Code:	**Carrier Name:** FedEx	**Relinquished By**	**(Date / Time)**	**Received By**	**(Date / Time)**
Account Code:	**Airbill:** 8392 8685 4299	1 [signature]	1/23/07 1830	FedEx	1/23/07 1830
CERCLIS ID:	**Shipped to:** ChemTech Consulting Group (CHEMED) 284 Sheffield Street Mountainside NJ 07092 (908) 789-8900	2			
Spill ID:		3			
Site Name/State: Wallace International/PR		4			
Project Leader: Dennis Foerter					
Action: Preliminary Assessment/Site Inspection (PA/SI)					
Sampling Co: Weston - SAT 2					

INORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME	ORGANIC SAMPLE No.	QC Type
MB3RR4	Soil (0"-24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-S01	S: 1/23/2007 11:20	B3RR4	--
MB3RR5	Soil (>24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-SS01	S: 1/23/2007 11:32	B3RR5	--
MB3RR6	Ground Water/ Scott Snyder	M/G	In/Hg (aq) (7)	(HNO3) (1)	WI-GW01	S: 1/23/2007 11:20	B3RR6	--
MB3RR7	Soil (0"-24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-S02	S: 1/23/2007 12:15	B3RR7	--
MB3RR8	Soil (>24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-SS02	S: 1/23/2007 14:05	B3RR8	--
MB3RR9	Soil (>24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-SS02A	S: 1/23/2007 14:05	B3RR9	Field Duplicate
MB3RS0	Ground Water/ Scott Snyder	M/G	In/Hg (aq) (7)	(HNO3) (1)	WI-GW02	S: 1/23/2007 13:44	B3RS0	--
MB3RS1	Ground Water/ Scott Snyder	M/G	In/Hg (aq) (7)	(HNO3) (1)	WI-GW02A	S: 1/23/2007 13:44	B3RS1	Field Duplicate
MB3RS2	Soil (0"-24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-S03	S: 1/23/2007 9:25	B3RS2	--
MB3RS3	Soil (>24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-SS03	S: 1/23/2007 10:10	B3RS3	--
MB3RS4	Ground Water/ Scott Snyder	M/G	In/Hg (aq) (7)	(HNO3) (1)	WI-GW03	S: 1/23/2007 9:50	B3RS4	--

Shipment for Case Complete? N	**Sample(s) to be used for laboratory QC:** MB3RR4, MB3RR6	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?** ______

In/Hg (aq) = TAL Inorganics/Mercury (aqueous), Inorg/Hg = TAL Inorganics/Mercury (soil)

TR Number: **2-291174636-012307-0004**

REGION COPY

PR provides preliminary results. Requests for preliminary results will increase analytical costs.

Send Copy to: Sample Management Office Attn: Mike Benhoff, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Ph 703/818-4200; Fax 703/818-4602

USEPA Contract Laboratory Program
Inorganic Traffic Report & Chain of Custody Record

Case No: 36113 **R**
DAS No:

Region:	2
Project Code:	
Account Code:	
CERCLIS ID:	
Spill ID:	
Site Name/State:	Wallace International/PR
Project Leader:	Dennis Foerter
Action:	Preliminary Assessment/Site Inspection (PA/SI)
Sampling Co:	Weston - SAT 2

Date Shipped:	1/23/2007
Carrier Name:	FedEx
Airbill:	8392 8685 4299
Shipped to:	ChemTech Consulting Group (CHEMED) 284 Sheffield Street Mountainside NJ 07092 (908) 789-8900

Chain of Custody Record Sampler Signature:

	Relinquished By	(Date / Time)	Received By	(Date / Time)
1		1/23/07 1830	Fed Ex	1/23/07 1830
2				
3				
4				

INORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		ORGANIC SAMPLE No.	QC Type
MB3RS8	Soil (0"-24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-S05	S: 1/23/2007	15:10	B3RS8	--
MB3RS9	Soil (>24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-SS05	S: 1/23/2007	15:20	B3RS9	--
MB3RT0	Ground Water/ Scott Snyder	M/G	In/Hg (aq) (7)	(HNO3) (1)	WI-GW05	S: 1/23/2007	15:00	B3RT0	--
MB3RT1	Soil (0"-24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-S06	S: 1/23/2007	16:07	B3RT1	--
MB3RT2	Soil (>24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-SS06	S: 1/23/2007	16:20	B3RT2	--
MB3RT3	Ground Water/ Scott Snyder	M/G	In/Hg (aq) (7)	(HNO3) (1)	WI-GW06	S: 1/23/2007	16:05	B3RT3	--
MB3RY4	Field QC/ Scott Snyder	M/G	In/Hg (aq) (7)	(HNO3) (1)	WI-RIN02	S: 1/23/2007	14:40	B3RY4	Rinsate

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC: MB3RR4, MB3RR6	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment Iced?

In/Hg (aq) = TAL Inorganics/Mercury (aqueous), Inorg/Hg = TAL Inorganics/Mercury (soil)

TR Number: 2-291174636-012307-0004

REGION COPY

PR provides pr[illegible]ry results. Requests for preliminary results will increase analytical costs.
Send Copy to: [illegible]e Management Office Attn: Mike Benhoff, CSC, 15000 Conference Center Dr., C[illegible]y, VA 20151-3819; Ph 703/818-4200; Fax 703/818-4602

FedEx Express International Air Waybill
For FedEx services worldwide

Sender's Copy

1 From Please print and press hard.

Date 01/23/07 Sender's FedEx Account Number 1090-6769-1

Sender's Name Scott Snyder Phone (732)406-8640

Company Weston Solutions, Inc.

Address c/o Mayaguez Resort

Address Route 104, Km 0.3

City Mayaguez State Province PR

Country Puerto Rico ZIP Postal Code 00680

27

2 To

Recipient's Name Parveen Hasan Phone (908)789-8900

Company ChemTech Consulting

Address 284 Sheffield St. Dept./Floor

Address

City Mountainside State Province NJ

Country USA ZIP Postal Code 07092

Recipient's Tax I.D. number for Customs purposes
e.g. GST/RFC/VAT/IN/EIN, or as locally required

3 Shipment Information ☐ For EU Only: Tick here if goods are not in free circulation and provide C.I.

Total Packages Shipper's Load and Count/SLAC 1 Total Weight 60.30 lbs. ☒ kg ☐ DIM 21 / 15 / 14 in. ☒ cm ☐

Commodity Description REQUIRED	Harmonized Code	Country of Manufacture	Value for Customs REQUIRED
Environmental Samples		USA	500-

For U.S. Export Only: Check One ☐ No SED required per Exemption ☐ No SED required, value $2500 or less per Schedule B Commodity number ☐ SED attached (provide export license no. and exp. date or license exception symbol, w/ECCN if applicable)

Total Declared Value for Carriage 500

Total Value for Customs (Specify Currency) 500- USD

4 Express Package Service Packages up to 150 lbs. / 68 kg. For packages over 150 lbs. (68 kg), use the FedEx Expanded Service Intl. Air Waybill.

Not all services and options are available to all destinations.

☒ FedEx Intl. Priority ☐ FedEx Intl. First Available to select locations. Higher rates apply.

☐ ☐ FedEx Intl. Economy FedEx Envelope and FedEx Pak rate not available

5 Packaging These unique brown boxes with special pricing are provided by FedEx for FedEx Intl. Priority only.

☐ FedEx Envelope ☐ FedEx Pak ☐ FedEx 10kg Box ☐ FedEx 25kg Box ☒ Other

6 Special Handling

☐ HOLD at FedEx Location ☐ SATURDAY Delivery Available to select locations. Available for FedEx Intl. Priority only

7a Payment Bill transportation charges to:

☒ Sender Acct. No. in Section 1 will be billed. Enter FedEx Acct. No. or Credit Card No. below. ☐ Recipient ☒ Third Party ☐ Credit Card ☐ Cash Check/Cheque

FedEx Acct. No. 1090-6769-1 FedEx Use Only

Credit Card No.

Credit Card Exp. Date

7b Payment Bill duties and taxes to: ALL shipments can be subject to Customs charges, which FedEx does not estimate prior to clearance.

☒ Sender Acct. No. in Section 1 will be billed. Enter FedEx Acct. No. below. ☐ Recipient ☒ Third Party

FedEx Acct. No. 1090-6769-1

8 Your Internal Billing Reference First 24 characters will appear on invoice.

20113.011.001.0053.00

9 Required Signature

Use of this Air Waybill constitutes your agreement to the Conditions of Contract on the back of this Air Waybill, and you represent that this shipment does not require a U.S. State Department License or contain Dangerous Goods. Certain international treaties, including the Warsaw Convention, may apply to this shipment and limit our liability for damage, loss, or delay, as described in the Conditions of Contract. WARNING: These commodities, technology, or software were exported from the United States in accordance with Export Administration Regulations. Diversion contrary to U.S. law prohibited.

Sender's Signature: Date Executed: 1/23/07

This is not authorization to deliver this shipment without a recipient signature.

For Completion Instructions, see back of fifth page.

464

PART 157593-Rev. Date 10/01 ©1994-2001 FedEx PRINTED IN U.S.A.

FedEx Tracking Number 8392 8685 4299 Form I.D. No. 0402

RETAIN THIS COPY FOR YOUR RECORDS

Try online shipping at fedex.com

EPA USEPA Contract Laboratory Program
Organic Traffic Report & Chain of Custody Record

Case No: 36113 R
DAS No:

Region:	2
Project Code:	
Account Code:	
CERCLIS ID:	
Spill ID:	
Site Name/State:	Wallace International/PR
Project Leader:	Dennis Foerter
Action:	Expanded Site Inspection (ESI)
Sampling Co:	Weston - SAT 2

Date Shipped:	1/24/2007
Carrier Name:	FedEx
Airbill:	8392 8685 3650
Shipped to:	Mitkem Corporation 175 Metro Center Blvd. Warwick RI 02886 (401) 732-3400

Chain of Custody Record

Sampler Signature:

	Relinquished By	(Date / Time)	Received By	(Date / Time)
1		1/24/07 1830	FedEx	1/24/07 1830
2				
3				
4				

ORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME	INORGANIC SAMPLE No.	QC Type
B3RW0	Soil (0"-24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-S09	S: 1/24/2007 16:20	MB3RW0	--
B3RW1	Soil (>24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-SS09	S: 1/24/2007 16:40	MB3RW1	--
B3RW2	Ground Water/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	WI-GW09	S: 1/24/2007 16:20	MB3RW2	--
B3RW3	Soil (0"-24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-S10	S: 1/24/2007 15:10	MB3RW3	--
B3RW6	Soil (0"-24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-S11	S: 1/24/2007 14:15	MB3RW6	--
B3RW7	Soil (0"-24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-S11A	S: 1/24/2007 14:20	MB3RW7	Field Duplicate
B3RW8	Soil (>24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-SS11	S: 1/24/2007 15:50	MB3RW8	--
B3RX0	Soil (0"-24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-S12	S: 1/24/2007 12:50	MB3RX0	--
B3RX1	Soil (>24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-SS12	S: 1/24/2007 13:35	MB3RX1	--
B3RX3	Soil (0"-24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-S13	S: 1/24/2007 8:05	MB3RX3	--
B3RX4	Soil (>24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-SS13	S: 1/24/2007 9:39	MB3RX4	--

2-5

Shipment for Case Complete? Y	Sample(s) to be used for laboratory QC: B3RW8	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment Iced? ______

% Moisture = TCL Percent Moisture (soil), TCL VOCs = TCL VOCs (soil), VOC (aq) = TCL VOCs (aqueous)

TR Number: 2-291174636-012407-0005

REGION COPY

PR provides pr... ry results. Requests for preliminary results will increase analytical costs.
Send Copy to: ...le Management Office Attn: Mike Benhoff, CSC, 15000 Conference Center Dr., C... ly, VA 20151-3819; Ph 703/818-4200; Fax 703/818-4602

USEPA Contract Laboratory Program
Organic Traffic Report & Chain of Custody Record

Case No: 36113
DAS No:

R

Region:	2	**Date Shipped:**	1/24/2007
Project Code:		**Carrier Name:**	FedEx
Account Code:		**Airbill:**	8392 8685 3650
CERCLIS ID:		**Shipped to:**	Mitkem Corporation 175 Metro Center Blvd. Warwick RI 02886 (401) 732-3400
Spill ID:			
Site Name/State:	Wallace International/PR		
Project Leader:	Dennis Foerter		
Action:	Expanded Site Inspection (ESI)		
Sampling Co:	Weston - SAT 2		

Chain of Custody Record — **Sampler Signature:**

	Relinquished By	(Date / Time)	Received By	(Date / Time)
1		1/24/07 1800	FedEx	1/24/07 1830
2				
3				
4				

ORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		INORGANIC SAMPLE No.	QC Type
B3RX5	Ground Water/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	WI-GW13	S: 1/24/2007	9:30	MB3RX5	--
B3RX6	Soil (0"-24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-S14	S: 1/24/2007	10:10	MB3RX6	--
29 B3RX7	Soil (>24")/ Scott Snyder	M/G	% Moisture (7), TCL VOCs (7)	(Ice Only) (4)	WI-SS14	S: 1/24/2007	11:25	MB3RX7	--
B3RX8	Ground Water/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	WI-GW14	S: 1/24/2007	11:20	MB3RX8	--
B3RY5	Field QC/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	WI-RIN03	S: 1/24/2007	15:25	MB3RY5	Rinsate
B3RY8	Field QC/ Scott Snyder	M/G	VOC (aq) (7)	(HCL) (3)	WI-TB03	S: 1/24/2007	9:00		Trip Blank

Shipment for Case Complete? Y	**Sample(s) to be used for laboratory QC:** B3RW8	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?**

% Moisture = TCL Percent Moisture (soil), TCL VOCs = TCL VOCs (soil), VOC (aq) = TCL VOCs (aqueous)

TR Number: 2-291174636-012407-0005

REGION COPY

PR provides preliminary results. Requests for preliminary results will increase analytical costs.
Send Copy to: Sample Management Office Attn: Mike Benhoff, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Ph 703/818-4200; Fax 703/818-4602

FedEx Express *International Air Waybill*
For FedEx services worldwide

Sender's Copy

1 From *Please print and press hard.*
Date 01/24/07 Sender's FedEx Account Number 1080-6769-1
Sender's Name Scott Snyder Phone (732)406-8640
Company Weston Solutions, Inc.
Address c/o Mayaguez Resort
Address Route 104, Km 0.3
City Mayaguez State Province PR
Country Puerto Rico ZIP Postal Code 00680

30

2 To
Recipient's Name Nathan Reynolds Phone (401)732-3400
Company Mitkem Corporation
Address 175 Metro Center Blvd. Dept/Floor
Address
City Warwick State Province RI
Country USA ZIP Postal Code 02886
Recipient's Tax I.D. number for Customs purposes
e.g. GST/RFC/VAT/IN/EIN, or as locally required

3 Shipment Information ☐ For EU Only: Tick here if goods are not in free circulation and provide C.I.
Total Packages (Shipper's Load and Count/SLAC) 1 Total Weight 55.65 ☒ lbs. ☐ kg DIM 021/015/014 ☒ in. ☐ cm

Commodity Description REQUIRED	Harmonized Code	Country of Manufacture	Value for Customs REQUIRED
Environmental Samples		USA	500-

☐ No SED required per Exemption
☒ No SED required, value $2500 or less per Schedule B Commodity number
☐ SED attached (provide export license no. and exp. date or license exception symbol, w/ECCN if applicable)
Total Declared Value for Carriage 500-
Total Value for Customs (Specify Currency) 500- USD

4 Express Package Service *Packages up to 150 lbs./68 kg* *For packages over 150 lbs. (68 kg), use the FedEx Expanded Service Intl. Air Waybill.*
Not all services and options are available to all destinations.
☒ FedEx Intl. Priority
☐ FedEx Intl. First — Available to select locations. Higher rates apply.
☐
☐ FedEx Intl. Economy — FedEx Envelope and FedEx Pak rate not available

5 Packaging These unique brown boxes with special pricing are provided by FedEx for FedEx Intl. Priority only.
☐ FedEx Envelope ☐ FedEx Pak ☐ FedEx 10kg Box ☐ FedEx 25kg Box ☒ Other

6 Special Handling
☐ HOLD at FedEx Location ☐ SATURDAY Delivery — Available to select locations. Available for FedEx Intl. Priority only

7a Payment *Bill transportation charges to:*
☐ Sender Acct. No. in Section 1 will be billed. Enter FedEx Acct. No. or Credit Card No. below. ☐ Recipient ☒ Third Party ☐ Credit Card ☐ Cash Check/Cheque
FedEx Acct. No. 1080-6769-1 FedEx Use Only
Credit Card No.
Credit Card Exp. Date

7b Payment *Bill duties and taxes to:* ALL shipments can be subject to Customs charges, which FedEx does not estimate prior to clearance.
☐ Sender Acct. No. in Section 1 will be billed. Enter FedEx Acct. No. below. ☐ Recipient ☒ Third Party
FedEx Acct. No. 1080-6769-1

8 Your Internal Billing Reference First 24 characters will appear on invoice.
20113.011.001.0053.00

9 Required Signature
Use of this Air Waybill constitutes your agreement to the Conditions of Contract on the back of this Air Waybill, and you represent that this shipment does not require a U.S. State Department License or contain Dangerous Goods. Certain international treaties, including the Warsaw Convention, may apply to this shipment and limit our liability for damage, loss, or delay, as described in the Conditions of Contract. WARNING: These commodities, technology, or software were exported from the United States in accordance with Export Administration Regulations. Diversion contrary to U.S. law prohibited.
Sender's Signature: Date Executed: 01/24/07
This is not authorization to deliver this shipment without a recipient signature.

For Completion Instructions, see back of fifth page.

FedEx Tracking Number 8392 8685 3650 Form I.D. No. 0402

464

PART 157593-Rev. Date 10/01 ©1994-2001 FedEx PRINTED IN U.S.A. GBF 12/02

RETAIN THIS COPY FOR YOUR RECORDS

Try online shipping at fedex.com

The terms and conditions of service may vary from country to country. Consult our local office for specific information.
Non-Negotiable International Air Waybill • ©1994-2001 Federal Express Corporation

Questions? Visit our Web site at fedex.com.
Or in the U.S., call 800.247.4747. Outside the U.S., call your local FedEx office.

USEPA Contract Laboratory Program
Inorganic Traffic Report & Chain of Custody Record

Case No: 36113 **R**
DAS No:

Region:	2
Project Code:	
Account Code:	
CERCLIS ID:	
Spill ID:	
Site Name/State:	Wallace International/PR
Project Leader:	Dennis Foerter
Action:	Expanded Site Inspection (ESI)
Sampling Co:	Weston - SAT 2

Date Shipped:	1/24/2007
Carrier Name:	FedEx
Airbill:	8392 8685 3660
Shipped to:	ChemTech Consulting Group (CHEMED) 284 Sheffield Street Mountainside NJ 07092 (908) 789-8900

Chain of Custody Record

Sampler Signature:

	Relinquished By	(Date / Time)	Received By	(Date / Time)
1		1/24/07 1830	FedEx	1/24/07 1830
2				
3				
4				

INORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		ORGANIC SAMPLE No.	QC Type
MB3RW0	Soil (0"-24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-S09	S: 1/24/2007	16:20	B3RW0	--
MB3RW1	Soil (>24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-SS09	S: 1/24/2007	16:40	B3RW1	--
MB3RW2	Ground Water/ Scott Snyder	M/G	In/Hg (aq) (7)	(HNO3) (1)	WI-GW09	S: 1/24/2007	16:20	B3RW2	--
MB3RW3	Soil (0"-24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-S10	S: 1/24/2007	15:10	B3RW3	--
MB3RW6	Soil (0"-24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-S11	S: 1/24/2007	14:15	B3RW6	--
MB3RW7	Soil (0"-24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-S11A	S: 1/24/2007	14:20	B3RW7	Field Duplicate
MB3RW8	Soil (>24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-SS11	S: 1/24/2007	15:50	B3RW8	--
MB3RX0	Soil (0"-24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-S12	S: 1/24/2007	12:50	B3RX0	--
MB3RX1	Soil (>24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-SS12	S: 1/24/2007	13:35	B3RX1	--
MB3RX3	Soil (0"-24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-S13	S: 1/24/2007	8:05	B3RX3	--
MB3RX4	Soil (>24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-SS13	S: 1/24/2007	9:39	B3RX4	--

31

Shipment for Case Complete? Y	Sample(s) to be used for laboratory QC: MB3RW8	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment Iced?

In/Hg (aq) = TAL Inorganics/Mercury (aqueous), Inorg/Hg = TAL Inorganics/Mercury (soil)

TR Number: 2-291174636-012407-0006

REGION COPY

PR provides preliminary results. Requests for preliminary results will increase analytical costs.

Send Copy to: Sample Management Office Attn: Mike Benhoff, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Ph 703/818-4200; Fax 703/818-4602

EPA **USEPA Contract Laboratory Program**
Inorganic Traffic Report & Chain of Custody Record

Case No: 36113 **R**
DAS No:

Region: 2
Project Code:
Account Code:
CERCLIS ID:
Spill ID:
Site Name/State: Wallace International/PR
Project Leader: Dennis Foerter
Action: Expanded Site Inspection (ESI)
Sampling Co: Weston - SAT 2

Date Shipped: 1/24/2007
Carrier Name: FedEx
Airbill: 8392 8685 3660
Shipped to: ChemTech Consulting Group (CHEMED)
284 Sheffield Street
Mountainside NJ 07092
(908) 789-8900

Chain of Custody Record

Sampler Signature:

	Relinquished By	(Date / Time)	Received By	(Date / Time)
1		1/24/07 1830	FedEx	1/24/07 1830
2				
3				
4				

INORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		ORGANIC SAMPLE No.	QC Type
MB3RX5	Ground Water/ Scott Snyder	M/G	In/Hg (aq) (7)	(HNO3) (1)	WI-GW13	S: 1/24/2007	9:30	B3RX5	--
MB3RX6	Soil (0"-24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-S14	S: 1/24/2007	10:10	B3RX6	--
MB3RX7	Soil (>24")/ Scott Snyder	M/G	Inorg/Hg (7)	(Ice Only) (1)	WI-SS14	S: 1/24/2007	11:25	B3RX7	--
MB3RX8	Ground Water/ Scott Snyder	M/G	In/Hg (aq) (7)	(HNO3) (1)	WI-GW14	S: 1/24/2007	11:20	B3RX8	--
MB3RY5	Field QC/ Scott Snyder	M/G	In/Hg (aq) (7)	(HNO3) (1)	WI-RIN03	S: 1/24/2007	15:25	B3RY5	Rinsate

Shipment for Case Complete? Y	Sample(s) to be used for laboratory QC: 43 MB3RW8	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment Iced? ______

In/Hg (aq) = TAL Inorganics/Mercury (aqueous), Inorg/Hg = TAL Inorganics/Mercury (soil)

TR Numb **2-291174636-012407-0006**

REGION COPY

PR provides pre ry results. Requests for preliminary results will increase analytical costs.
Send Copy to: S e Management Office Attn: Mike Benhoff, CSC, 15000 Conference Center Dr., C y, VA 20151-3819; Ph 703/818-4200; Fax 703/818-4602

4

FedEx Express **International Air Waybill** For FedEx services worldwide

Sender's Copy

33

1 From *Please print and press hard*

Date 01/24/07 Sender's FedEx Account Number 1090-6769-1

Sender's Name Scott Snyder Phone (732)406-8640

Company Weston Solutions, Inc.

Address c/o Mayaguez Resort

Address Route 104, Km 0.3

City Mayaguez State Province PR

Country Puerto Rico ZIP Postal Code 00680

2 To

Recipient's Name Parveen Hasan Phone (908)789-8900

Company ChemTech Consulting

Address 284 Sheffield St. Dept./Floor

Address

City Mountainside State Province NJ

Country USA ZIP Postal Code 07092

Recipient's Tax I.D. number for Customs purposes e.g. GST/RFC/VAT/IN/EIN, or as locally required

3 Shipment Information ☐ For EU Only: Tick here if goods are not in free circulation and provide C.I.

Total Packages Shipper's Load and Count/SLAC 1 Total Weight 60.35 lbs. ☒ kg ☐ DIM 21 / 15 / 14 in. ☒ cm ☐

Commodity Description REQUIRED	Harmonized Code	Country of Manufacture	Value for Customs REQUIRED
Environmental Samples		USA	500 -

For U.S. Export Only Check One: ☐ No SED required per Exemption; ☒ No SED required, value $2500 or less per Schedule B Commodity number; ☐ SED attached (provide export license no. and exp. date or license exception symbol, w/ECCN if applicable)

Total Declared Value for Carriage 500 -

Total Value for Customs (Specify Currency) 500 - USD

4 Express Package Service *Packages up to 150 lbs. / 68 kg* For packages over 150 lbs. (68 kg), use the FedEx Expanded Service Intl. Air Waybill.

Not all services and options are available to all destinations.

☒ FedEx Intl. Priority ☐ FedEx Intl. First Available to select locations. Higher rates apply.

☐ ☐ FedEx Intl. Economy FedEx Envelope and FedEx Pak rate not available

5 Packaging These unique brown boxes with special pricing are provided by FedEx for FedEx Intl. Priority only.

☐ FedEx Envelope ☐ FedEx Pak ☐ FedEx 10kg Box ☐ FedEx 25kg Box ☒ Other

6 Special Handling

☐ HOLD at FedEx Location ☐ SATURDAY Delivery Available to select locations. Available for FedEx Intl. Priority only

7a Payment *Bill transportation charges to:*

☐ Sender Acct. No. in Section 1 will be billed. Enter FedEx Acct. No. or Credit Card No. below. ☐ Recipient ☒ Third Party ☐ Credit Card ☐ Cash Check/Cheque

FedEx Acct. No. 1090-6769-1 FedEx Use Only

Credit Card No.

Credit Card Exp. Date

7b Payment *Bill duties and taxes to:* ALL shipments can be subject to Customs charges, which FedEx does not estimate prior to clearance.

☐ Sender Acct. No. in Section 1 will be billed. Enter FedEx Acct. No. below. ☐ Recipient ☒ Third Party

FedEx Acct. No. 1090-6769-1

8 Your Internal Billing Reference First 24 characters will appear on invoice.

20113.011.~~001~~0053.00

9 Required Signature

Use of this Air Waybill constitutes your agreement to the Conditions of Contract on the back of this Air Waybill, and you represent that this shipment does not require a U.S. State Department License or contain Dangerous Goods. Certain international treaties, including the Warsaw Convention, may apply to this shipment and limit our liability for damage, loss, or delay, as described in the Conditions of Contract. WARNING: These commodities, technology, or software were exported from the United States in accordance with Export Administration Regulations. Diversion contrary to U.S. law prohibited.

Sender's Signature: Date Executed: 1/24/07

This is not authorization to deliver this shipment without a recipient signature.

For Completion Instructions, see back of fifth page.

FedEx Tracking Number 8392 8685 3660 Form I.D. No. 0402

464

PART 157593 Rev. Date 10/01 ©1994-2001 FedEx PRINTED IN U.S.A.

RETAIN THIS COPY FOR YOUR RECORDS

Try online shipping at fedex.com

The terms and conditions of service may vary from country to country. Consult our local office for specific information. Non-Negotiable International Air Waybill • ©1994-2001 Federal Express Corporation

Questions? Visit our Web site at fedex.com.

Or in the U.S., call 800.247.4747. Outside the U.S., call your local FedEx office.

THIS PAGE
INTENTIONALLY BLANK

REFERENCE 15

RECORD OF COMMUNICATION

TO: Ildefonso Acosta

FROM: Adly Michael

SUBJECT: QUALITY ASSURED DATA

Wallace International site, CLP case # 36113, SDGs# B3RS5, B3RS7, B3RWØ, total of 18 water and 32 soil samples analyzed for VOA.

REPLY BY: 2/27/2007

PLEASE SIGN BELOW IN ACKNOWLEDGEMENT OF RECEIPT OF THE FOLLOWING VALIDATED DATA AND RETURN A COPY OF THIS RECORD OF COMMUNICATION TO THE RSCC-REGION II, BY INTER-OFFICE MAIL AT EDISON MS-215, OR FAX AT 732-321-6622.

COMMENTS:

SIGNATURE: ____________________ DATE: ____________

DATE RECEIVED BY EPA-RSCC: ______________

ATTACHMENT 1
SOM1.1/ Trace Volatiles
SOP NO. HW-34, Rev. 0

CLP DATA ASSESSMENT

Functional Guidelines for Evaluating Organic Analysis

CASE No.: 36113
LABORATORY: MITKEM
SAMPLER: W-SAT

SDG No.: B3RS7
SITE: Wallace International
ANALYSIS: LC VOA

DATA ASSESSMENT

The current SOP HW-34 (Revision 0) April 2006, USEPA Region II Data Validation SOP for Statement of Work SOM01.1 for evaluating Low Concentration Volatile organic data has been applied.

All data are valid and acceptable except those analytes rejected "R"(unusable). Due to the detection of QC problems, some analytes may have the "J" (estimated), "N"(presumptive evidence for the presence of the material), "U" (non-detect) or "JN" (presumptive evidence for the presence of the material at an estimated value) flag. All action is detailed on the attached sheets.

The "R" flag means that the associated value is unusable. In other words, significant data bias is evident and the reported analyte concentration is unreliable.

Reviewer's Signature: John Bulich — Date: February 16, 2007

Verified By: — Date: 2 /16 /2006

Peer Review By: — Date: February 16, 2007

CLP DATA ASSESSMENT

B3RS7

1. HOLDING TIME:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded.

The following action was taken in the samples and analytes shown due to excessive holding time.

No problems found for this qualification.

2. DEUTERATED Monitoring Compounds (DMCs)

All samples are spiked with DMC compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate concentrations were outside contract specifications, qualifications were applied to the samples and analytes as shown below.

The following volatile samples have DMC recoveries greater than the upper limit of the criteria window. All positive associated target compounds are qualified "J" and non-detects are not qualified.

B3RS4, B3RY4, B3RY5, B3RX5DL, B3RX8DL, B3RR6DL
Dichlorodifluoromethane, Chloromethane, Bromomethane, Chloroethane, Carbon Disulfide

B3RT6
trans-1,2-Dichloroethene, cis-1,2-Dichloroethene

3. MATRIX SPIKE/ MATRIX SPIKE RECOVERY:

The MS/MSDdata is generated to determine the long-term precision and accuracy of the analytical method in various matrices. The MS/MSD may be used in conjunction with other QC criteria for additional qualification of data.

Not applicable.

4. BLANK CONTAMINATION:

Quality assurance (QA) blanks, i.e., method, trip, field, or rinse blanks are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Trip blanks measure cross-contamination of samples during shipment. Field and rinse blanks measure cross-contamination of samples during field operations. Depending on the amount of contamination present in the QA blanks, the analytes are qualified as non-detects, "U". The following analytes in the sample shown were qualified with "U" for these reasons:

YES NO N/A

. . . .

PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 36113. LAB: MITKEM.

SITE NAME: WALLACE INTERNATIONAL SITE. SDG No(s).: B3RW0.

1.0 Chain of Custody and Sampling Trip Reports

1.1 Are the Traffic Reports/Chain-of-Custody Records present for all samples? [✓] ___ ___

ACTION: If no, contact RSCC, or the TOPO to obtain replacement of missing or illegible copies from the lab.

1.2 Is the Sampling Trip Report present for all samples? [✓] ___ ___

ACTION: If no, contact either RSCC or ask the TOPO to obtain the necessary information from the prime contractor.

2.0 Data Completeness and Deliverables

2.1 Have any missing deliverables been received and added to the data package? ___ [✓] ___

ACTION: Contact the TOPO to obtain an explanation or resubmittal of any missing deliverables from the lab. If lab cannot provide them, note the effect on the review of the data package in the Contract Problems/Non-compliance section of the Data Assessment.

2.2 Was CLASS CCS checklist included with the package? [✓] ___ ___

2.3 Are there any discrepancies between the Traffic Reports/Chain-of-Custody Records, and Sampling Trip Report? ___ [✓] ___

	YES	NO	N/A

. . . .

ACTION: If yes, contact the TOPO to obtain an explanation or resubmittal of any missing deliverables from the laboratory.

3.0 Cover Letter SDG Narrative

		YES	NO	N/A
3.1	Is the SDG Narrative or Cover Letter Present?	[✓]	___	___
3.2	Are case number, SDG number and contract number contained in the SDG Narrative or cover letter (see SOW, Exhibit B, section 2.5.1)? EPA sample numbers in the SDG, detailed documentation of any quality control, sample, shipment, and/or analytical problems encountered in processing the samples? Corrective action taken?	[✓]	___	___
3.3	Does the Narrative contain the following information SOM01.1, page B-12, section 2.5.1)? Description of trap, column used, storage of samples, case#, SDG#, analytical problems, and discrepancies between field and lab weights.	[✓]	___	___
3.4	Does the narrative, VOA section, contain a list of all TICs identified as alkanes and their estimated concentrations?	[ ]	✓	___
3.5	Did the contractor record the temperature of the cooler on the Form DC-1, Item 9 - Cooler Temperature, and in the SDG Narrative?	[✓]	___	___
3.6	Does the narrative contain a list of the pH values determined for each water sample submitted for volatiles analysis (SOW, page B-13, section 2.5.1.2)?	[ ]	___	✓
3.7	Does the Case Narrative contain the "verbatim" statement (page B-12, section 2.5.1 of the SOM)?	[✓]	___	___

ION: If "No", to any question in this section, contact the TOPO to obtain necessary

	YES	NO	N/A

resubmittals. If unavailable, document under the Contract Problems/ Non-Compliance section of the Data Assessment.

4.0 Data Validation Checklist

4.1 Check the package for the following (see SOM reporting requirements, section 2.1, page B-10):

	YES	NO	N/A
a. Is the package paginated in ascending order starting from the SDG narrative?	[✓]	___	___
b. Are all forms and copies legible?	[✓]	___	___
c. Assembled in the order set forth in the SOW?	[✓]	___	___
Low/Med Concentration Volatiles Data present?	[✓]	___	

Action: Take action as specified in section 3.7 above.

PART A: Low/Medium Volatile ANALYSES

1.0 Sample Conditions/Problems

	YES	NO	N/A
1.1 Do the Traffic Reports/Chain-of-Custody Records, Sampling Trip Report or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data?	___	[✓]	___

ACTION: If samples were not iced or the ice was melted upon arrival at the laboratory and the temperature of the cooler was > 10° C, then flag all positive results with a "J" and all non-detects "UJ".

ACTION: If both VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

YES NO N/A

. . . .

2.0 Holding Times

2.1 Have any VOA technical holding times, determined from date of collection to date of analysis, been exceeded? ___ [✓] ___

2.2 Preservation: Aqueous samples must be preserved with HCL to pH of 2 or below and cooled at 4°C ± 2°C. Non-aqueous samples: frozen (less than -7°C) or properly cooled (4°C ± 2°C) and preserved with $NaHSO_4$.

Action: Qualify sample results according to the following table.

Holding Time Actions for Low/Medium Volatile Analyses

Matrix	Preserved	Criteria	ACTION	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤ 7 Days	NO Action	
	No	> 7 Days	J	R
	Yes	≤ 14 Days	No Action	
	Yes	> 14 Days	J	R
Non-Aqueous	No	≤ 14 Days	J	R
	Yes	≤ 14 Days	No Action	
	Yes/No	> 14 Days	J	R

YES NO N/A

3.0 Deuterated Monitoring Compound (DMC) Recovery (Form II)

3.1 Are the Volatile SMC Recovery Summaries (Form II present? [✓] ___ ___

ACTION: Contact the TOPO to obtain an explanation/resubmittal from the lab. If missing deliverables are unavailable, document the effect in the Data Assessment.

3.2 Were outliers marked correctly with an asterisk? [✓] ___ ___

ACTION: Circle all outliers in red.

3.3 Were more than three of the fourteen (14) Deuterated Monitoring Compounds (DMC's) recoveries outside their corresponding limits? ✓ [ ] ___

If yes, were samples re-analyzed? [✓] ___ ___

Were method blanks re-analyzed? [ ] ✓ ___

ACTION: If any DMC is outside the required limits (see Table below), qualify their associated target compounds (See Table below) as follows:

VOLATILE DMC AND THEIR ASSOCIATED TARGET COMPOUNDS

Chloroethane-d5	1,2-Dichloropropane-d6	1,2-Dichlorobenzene-d4
Dichlorodifluoromethane	Cyclohexane	Chlorobenzene
Chloromethane	Methylcyclohexane	1,3-Dichlorobenzene
Bromomethane	1,2-Dichloropropane	1,4-Dichlorobenzene
Chloroethane	Bromodichloromethane	1,2-Dichlorobenzene
Carbon Disulfide		1,2,4-Trichlorobenzene
		1,2,3-Trichlorobenzene

YES NO N/A

. . . .

<u>1,4-Dioxane-d8</u> 1,4-Dioxane	<u>trans-1,3-Dichloropropene-d4</u> cis-1,3-Dichloropropene trans-1,3-Dichloropropene 1,1,2-Trichloroethane	<u>Chloroform-d</u> 1,1-Dichloroethane Bromochloromethane Chloroform Dibromochloromethane Bromoform
<u>2-Butanone-d5</u> Acetone 2-butanone	<u>1,1-dichloroethene-d2</u> trans-1,2-Dichloroethene cis-1,2-Dichloroethene	<u>2-Hexanone-d5</u> 4-Methyl-2-pentanone 2-Hexanone
<u>Vinyl Chloride-d3</u> Vinyl Chloride	<u>Benzene-d6</u> Benzene	<u>1,1,2,2-Tetrachloroethane-d2</u> 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane
<u>1,2-Dichloroethane-d4</u> Trichlorofluoromethane 1,1-Dichloroethene 1,1,2-Trichloro-1,2,2-trifluoroethane Methyl Acetate Methylene Chloride Methyl tert-Butyl Ether Carbon Tetrachloride 1,2-Dichloroethane 1,1,1-Trichloroethane 1,2-Dibromoethane	<u>Toluene-d8</u> Trichloroethene Toluene Tetrachloroethene Ethylbenzene o-Xylenes m,p-Xylene Styrene Isopropylbenzene	

YES NO N/A

. . . .

VOLATILE DEUTERATED MONITORING COMPOUND RECOVERY LIMITS

DMC	Recovery Limits (%) for Water Samples	Recovery Limits (%) for Soil samples
Vinyl Chloride-d3	65 - 131	68 - 122
Chloroethane-d5	71 - 131	61 - 130
1,1-Dichloroethene-d2	55 - 104	45 - 132
2-Butanone-d5	49 - 155	20 - 182
Chloroform-d	78 - 121	72 - 123
1,2-Dichloroethane-d4	78 - 129	79 - 122
Benzene-d6	77 - 124	80 - 121
1,2-Dichloropropane-d6	79 - 124	74 - 124
Toluene-d8	77 - 121	78 - 121
trans-1,3-Dichloropropene-d4	73 - 121	72 - 130
2-Hexanone-d5	28 - 135	17 - 184
1,4-Dioxane-d8	50 - 150	50 - 150
1,1,2,2-Tetrachloroethane-d2	73 - 125	56 - 161
1,2-Dichlorobenzene-d4	80 - 131	70 - 131

1. For any recovery greater than the upper limit:

   a. Qualify "J" all positive associated target compounds.
   b. Do not qualify associated non-detects.

2. For any recovery greater than or equal to 20%, but less than the lower limit:

   a. Qualify "J" all positive associated target compounds.

YES NO N/A

. . . .

b. Qualify "UJ" associated non-detects.

3. For any recovery less than 20%:

a. Qualify "J" all positive associated target compounds.
b. Qualify "R" all associated non-detects.

NOTE: Up to three (3) DMC's per sample, excluding 1,4-Dioxane-d8, may fail to meet the recovery limits. (SOM, sec. 11.3.4, pg. D-45/Low Medium VOA). Recovery limits for 1,4-Dioxane-d8 are advisory.
As per SOM, any sample which has more than 3 DMC's outside the limits, it must be reanalyzed (SOM sec. 11.4.3.1 pg. D-46/Low Medium VOA).

ACTION: Note in the Data Assessment under Contract Problems/ Non-Compliance if the Lab did not perform reanalysis.

3.4 Are there any transcription/calculation errors between raw data and form II? ___ [✓] ___

ACTION: If large errors exist, ask the TOPO to obtain an explanation/resubmittal from the lab, make any necessary corrections and note errors in the data assessment.

4.0 Matrix Spike/Matrix Spike Duplicate Recovery (Form III)

Note: Data for MS/MSD will not be present unless requested.

4.1 Are the MS/MSD Recovery Forms (Form III Low/Med VOA) present? [ ] ✓ ___

4.2 Was the MS/MSD analyzed at the required frequency (once per SDG, or every 20 samples, whichever is more frequent)? [ ] ✓ ___

ACTION: If any MS/MSD data are missing, take action as specified in section 3.1 above.

ACTION: No action is taken on MS/MSD data alone. However, using professional judgement, the validator may use the MS and MSD results in conjunction with other

YES NO N/A

. . . .

QC criteria and determine the need for some qualification of the data.

5.0 Method Blanks (Form IV)

5.1 Is the Volatile Method Blank Summary (Form IV VOA) present for aqueous and soil samples? [✓] ___ ___

5.2 Frequency of Analysis: For the analysis of Low/Med Concentration VOA TCL compounds, has a method blank been analyzed for each SDG or every 20 samples, whichever is more frequent? [✓] ___ ___

5.3 Has a VOA method blank been analyzed after the calibration standards and once every 12 hours time period for each GC/MS instrument used? [✓] ___ ___

5.4 Was a VOA instrument blank analyzed after each sample/dilution that contains a target compound exceeding the initial calibration range (see SOM, page D-48/Low/Medium VOA, section 12.1.1.3)? [ ] ___ ✓

ACTION: If any method/instrument blank data are missing, notify the TOPO to obtain resubmittals or an explanation from the lab. If method blank data are unavailable, the reviewer may use professional judgement, or substitute field blank or trip blank data for missing method blank data.

If an instrument blank was not analyzed after a sample containing a target analyte exceeding the initial calibration standards, inspect the sample chromatogram acquired immediately after this sample for possible carryover. The system is considered uncontaminated if the target analyte is below CRQL. Use professional judgement to determine if carryover occurred and qualify analyte(s) accordingly.

5.5 Was a storage blank analyzed once per SDG after all the samples were analyzed? [✓] ___ ___

YES NO N/A

ACTION: If storage blank data is missing, contact the TOPO to obtain any missing deliverables from the laboratory. If unavailable, note in the Contract Problems/Non-Compliance section of the Data Assessment.

5.6 The validator should verify that the correct identification scheme for EPA blanks was used. (See SOM page B-39, section 3.3.7.3 for more information.)

Was the correct identification scheme used for all Low/Med VOA blanks? [/] ___ ___

ACTION: Contact the TOPO to obtain corrections from the lab, or make the necessary corrections. Document in the "Contract Problems/Non-Compliance section of the Data Assessment all corrections made by the validator.

5.7 <u>Chromatography</u>: review the blank raw data - chromatograms (RICs), quant. reports, data system printouts and spectra.

Also compare the storage blank raw data with the method blank. Determine if contamination in the storage blank is also present in the method blank.

Is the chromatographic performance (baseline stability) for each instrument acceptable for Low/Med VOAs? [/] ___ ___

ACTION: Use professional judgement to determine the effect on the data.

5.8 Are all detected hits for target compounds in method, and storage blanks less than the CRQL? [/] ___ ___

<u>Exception</u>: Methylene Chloride, Acetone and 2-butanone must be less than 2X times their respective CRQLs.

ACTION: If no, an explanation and laboratory's corrective actions must be addressed in the case narrative. If the narrative contains no explanation, then make a note in the Contract Problems/Non-Compliance section of the Data Assessment.

YES　NO　N/A

6.0 Contamination

NOTE: "Water blanks", "drill blanks", and distilled water blanks" are validated like any other sample, and are not used to qualify data. Do not confuse them with the other QC blanks discussed below.

6.1 Does the storage blank contain positive results (TCL and/or TICs) for Low/Med Concentration VOAs? ___ [✓] ___

6.2 Do any method/reagent/instrument blanks contain positive results (including TICs) for Low/Med Concentration VOAs? ___ [✓] ___

NOTE: Contaminated instrument blanks are unacceptable under this SOW (see page D-50/VOA, section 12.1.5.2).

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance if a contaminated instrument blank was submitted.

ACTION: Sample analysis results after the high concentration sample must be evaluated for carryover. Sample must meet the maximum carryover criteria as listed in SOM sec. 11.3.8 p. D-46/VOA.("the sample must not contain a concentration above the CRQL for the target compounds that exceeded the limit in the contaminated sample.")

6.3 Do any field/trip/rinse blanks have positive hits for Low/Med VOA results (including TICs)? ___ [ ] ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated with a particular group of samples (may exceed one per case) must be used to qualify data. Trip blanks are used to qualify only those samples with which they were shipped. Blanks may not be qualified because of contamination in another blank.

YES NO N/A

. . . .

Field blanks & trip blanks must be qualified for system monitoring compound, instrument performance criteria, spectral or calibration QC problems.

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks. If any blanks are grossly contaminated, all associated sample data should be qualified unusable (R).

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field, Trip, Storage, Instrument **	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report blank concentration for sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required
	Gross contamination	Detects	Qualify results as unusable R
	TIC > 2ug/L	Detects	See "Action" below

* 2x the CRQL for methylene chloride, 2-butanone and acetone

** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

YES NO N/A

NOTE: Analytes qualified "U" for blank contamination are treated as "hits" when qualifying for calibration criteria.

Note: When applied as described in the table above, the contaminant concentration in the blank are multiplied by the sample dilution factor.

ACTION : For TIC compounds, if the concentration in the sample is less than five times the concentration in the most contaminated associated blank, flag the sample data "R" (unusable).

6.4 Are there field/rinse/equipment blanks associated with every sample? [✓] ___ ___

ACTION: Note in data assessment that there is no associated field/rinse/equipment blank.

<u>Exception</u>: samples taken from a drinking water tap do not have associated field blanks.

7.0 <u>GC/MS Instrument Performance Check (Form V)</u>

7.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for Bromofluorobenzene (BFB)? [✓] ___ ___

7.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? [✓] ___ ___

7.3 Did the 12-hour clock begin with either the injection of BFB, or in cases where a closing continuing calibration (CCV) was used as an opening CCV? [✓] ___ ___

Listed below are some, but not necessarily all, examples of acceptable analytical sequences incorporating the use of the opening/closing CCV. Use these examples as a guide for possible analytical sequences that can be expected.

YES NO N/A

Conditions for When Example Sequence is Appropriate:	Acceptable Criteria That Must be Met:	Notes:
If time remains on the 12 hour clock after initial calibration sequence	• BFB tunes meet instrument performance criteria. • The five initial calibration standards meet initial calibration criteria. • CCV A meets both opening and closing CCV criteria • CCV B meets closing CCV criteria.	The requirement of starting the new 12-hr clock for Analytical Sequence 2 with a new BFB tune is waived if CCV A meets opening CCV criteria. If CCV B meets opening CCV criteria, a method blank and subsequent samples may be analyzed immediately after CCV B.
If time remains on the 12 hour clock after initial calibration sequence	• BFB tunes meet instrument performance criteria. • The five initial calibration standards meet initial calibration criteria. • CCV A meets closing CCV criteria (but does not meet opening CCV criteria). • CCV B meets opening CCV criteria. • CCV C meets closing CCV Criteria.	CCV A does not meet opening criteria, therefore a new BFB tune must be performed, immediately followed by CCV B before a method blank and any samples may be analyzed. In this case, the new 12 hr clock and Analytical Sequence 2 begins with the injection of the new BFB tune.
If more than 12 hrs have elapsed since the most recent initial calibration or closing CCV. OR If the most recent closing CCV was not or could not be used as an opening CCV.	• BFB tunes meet instrument performance criteria. • CCV A meets opening CCV criteria. • CCV B meets both opening and closing CCV criteria. • CCV C meets both opening and closing CCV criteria.	The requirement of starting the new 12 hour clock for Analytical Sequence 2 with a new BFB tune is waived if CCV B meets opening CCV criteria. If CCV C meets opening CCV criteria, a method blank and subsequent samples may be analyzed immediately after CCV B.

YES NO N/A

. . . .

If more than 12 hrs have elapsed since the most recent initial calibration or closing CCV OR If the most recent closing CCV was not or could not be used as an opening CCV	• BFB tunes meet instrument performance criteria. • CCV A meets opening CCV criteria. • CCV B meets closing CCV criteria (but does not meet opening CCV criteria). • CCV C meets opening CCV Criteria. • CCV D meets both opening and closing CCV criteria.	CCV B does not meet opening CCV criteria, therefore a new BFB tune must be performed, immediately followed by CCV B before a method blank and any samples may be analyzed. In this case, the new 12 hr clock and Analytical Sequence 2 begins with the injection of the new BFB tune. The requirement of starting the new 12 hr clock for Analytical Sequence 3 with a new BFB tune is waived if CCV D meets opening CCV criteria. If CCV D meets opening criteria, a method blank and subsequent samples may be analyzed after CCV B.

7.4 Have the ion abundances been normalized to m/z 95 [✓] ___ ___

NOTE: All ion abundance ratios must be normalized to m/z 95, the nominal base peak, even though the ion abundance of m/z 174 may be up to 120% that of m/z 95.

ACTION: If mass assignment is in error, qualify all associated data as unusable (R).

7.5 Have the ion abundance criteria been met for each instrument used? [✓] ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, professional Judgement may be applied to determine to what extent the data may be utilized.

7.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.) ___ [✓] ___

7.7 Is the number of significant figures for the reported relative abundances consistent with the number given in the ion abundance criteria column on Form V ? [✓] ___ ___

	YES	NO	N/A
ACTION: If large errors exist, take action as specified in section 3.1 above.			
7.8 Is the spectrum of the mass calibration compound acceptable?	[✓]	___	___
ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.			

8.0 **Target Compound List (TCL) Analytes (Form I)**

	YES	NO	N/A
8.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate?	[✓]	___	___
b. Regional Control/MS/MSD samples?	[ ]	✓	___
c. Blanks (method, trip, etc)?	[✓]	___	___
8.2 Are the VOA Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following:			
a. Samples and/or fractions as appropriate?	[✓]	___	___
b. Regional Control/MS/MSD samples?	[ ]	✓	___
c. Blanks (method, trip, etc)?	[✓]	___	___
ACTION: If any data are missing, take action specified in 3.1 above.			
8.3 Is chromatographic performance acceptable with respect to:			
Baseline stability?	[✓]	___	___
Resolution?	[✓]	___	___
Peak shape?	[✓]	___	___
Full-scale graph (attenuation)?	[✓]	___	___
Other: ____________________?	[✓]	___	___
ACTION: Use professional judgement to determine the acceptability of the data.			
8.4 Are lab-generated standard mass spectra of the identified VOA compounds present for each sample?	[✓]	___	___

YES NO N/A

. . . .

ACTION: If any mass spectra are missing, take action as specified in 3.1 above. If lab does not generate their own standard spectra, make note under the "Contract Problems/Non-Compliance" section of the Data Assessment. If spectra are unavailable reject "R" the reported results.

8.5 Is the RRT of each reported compound within ± 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

8.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum? [✓] ___ ___

8.7 Do sample and standard relative ion intensities agree to within ± 20%? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R) flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in sections 8.4-8.7 above.

ACTION: When sample carry-over is suspected, review section 6.2/Action #2 above before determining if instrument cross-contamination has affected positive compound identifications.

9.0 Tentatively Identified Compounds (TIC)

9.1 Are all Tentatively Identified Compound Forms (Form I VOA-TIC) present? Do listed TICs include scan number or retention time, as well as the estimated "J" and/or "JN" qualifier? [✓] ___ ___

9.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate? [✓] ___ ___

b. Blanks? [ ] ✓ ___

b. Are Alkanes listed in/or part of the Case Narrative? [ ] ✓ ___

ACTION: If any TIC data are missing, take action specified in 3.1 above.

	YES	NO	N/A

. . . .

ACTION: Verify "JN" qualifier is present for all chemically named TICs having a percent match of greater than or equal 85%. TICs labeled "unknown" are qualified with a "J" qualifier.

	YES	NO	N/A
9.3 Are any target compounds (from any fraction) listed as TICs? (Example: 1,2-dimethylbenzene is xylene - a VOA target analyte - and should not be reported as a TIC.)	___	[✓]	___

ACTION: Flag with "R" only target compound detected in another fraction (except blank contamination).

	YES	NO	N/A
9.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% also present in the sample mass spectrum?	[✓]	___	___
9.5 Do TICs and "best match" reference spectra relative ion intensities agree within ± 20%?	[✓]	___	___

ACTION: Use professional judgement to determine the acceptability of TIC identifications. If it is determined that an incorrect identification was made, change its identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate.

Action: When a compound is not found in any blank, but is detected in a sample and is a suspected artifact of a common laboratory contaminant, solvent preservatives or Aldo condensation, the result should be qualified as unusable (R). (i.e., common lab contaminants such as CO_2 (m/e 44), Siloxanes (m/e 73), diethyl ether, hexane, certain freons. Aldol condensation products: 4-hydroxy-4-methyl-2-pentanone, 4-methyl-2-penten-2-one, and 5,5-dimethyl-2(H)-furanone. Solvent preservatives cyclohexene, and related by-products: cyclohexanone, cyclohexenone, cyclohexanol, cyclohexenone, chlorocyclohexene, and chlorocyclohexanol.).

10.0 Compound Quantitation and Reported Detection Limits

	YES	NO	N/A
10.1 Are there any transcription/calculation errors in Form I results? (Check at least two positive values. Verify that the correct internal standards, quantitation ions, and RRFs were used to calculate Form I results.)	___	[✓]	___
10.2 Are the CRQLs adjusted to reflect sample dilutions and per cent moisture?	[✓]	___	___

ACTION: If errors are large, take action as specified in section 3.1 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the

YES NO N/A

higher CRQLs data from the diluted sample). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and its corresponding value on the original Form I and substituting the data from the diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's not to be used, including any in the data summary package.

10.3 For non-aqueous samples, were the percent moisture < 70%? [ ] ✓ ___

Action: If the % moisture ≥ 70.0% and < 90.0%, qualify detects as "J" and non-detects as approximated "UJ" If the % Moisture ≥ 90%, qualify detects as "J" and non-detects as "R"

11.0 Standards Data (GC/MS)

11.1 Are the reconstructed ion chromatograms, and data system printouts (quant. reports) present for each initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.1 above.

12.0 GC/MS Initial Calibration (Form VI)

12.1 Are the Initial Calibration Forms (Form VI LCV) present and complete for the volatile fraction at concentrations of 5, 10, 50, 100, and 200 µg/ℓ for non-ketones, 10, 20, 100, 200 and 400 ug/L for ketones and 100, 200, 1250, 2000, and 4000 ug/L for 1,4-dioxane. [✓] ___ ___

ACTION: If any Initial Calibration forms are missing, take action as specified in section 3.1 above.

12.2 Are the relative standard deviation (RSD) stable for VOA's over the concentration range of the calibration (i.e., %RSD ≤ 20.%, ≤ 40% for poor performers (see table below), ≤ 50% for 1,4-dioxane)? [ ] ✓ ___

ACTION: Circle all outliers in red.

NOTE: The twenty two (22) poor performers compounds and associated DMCs are listed below. The relative response factor (RRF) for these compounds must be greater than or equal to 0.010.

YES NO N/A

. . . .

Volatile Compounds Exhibiting Poor Response

Volatile Compounds	
Acetone	1,2-Dibromo-3-chloropropane
2-Butanone	Isopropylbenzene
Carbon disulfide	Methyl acetate
Chloroethane	Methylene chloride
Chloromethane	Methylcyclohexane
Cyclohexane	Methyl tert-butyl ether
1,4-Dioxane	trans-1,2-Dichloroethene
1,2-Dibromoethane	4-Methyl-2-pentanone
Dichlorodifluoromethane	2-Hexanone
cis-1,2-dichloroethene	Trichlorofluoromethane
1,2-Dichloropropane	1,1,2-Trichloro-1,2,2-trifluoroethane

ACTION: If %RSD > 20.0%, (> 40.0% for the poor performers, and > 50% for 1,4-dioxane), qualify associated positive results for that analyte "J" (estimated). If %RSD is > 90, flag all non-detects for that analyte "R" (unusable) and positive results "J".

NOTE: Analytes previously qualified "U" for blank contamination are still treated as "hits" when qualifying for initial calibration criteria.

12.3 Are any $\overline{RRF}$s < 0.050 (< 0.010 for poor performers)? ✓ [ ] ___

ACTION: Circle all outliers in red.

ACTION: If any $\overline{RRF}$ values are < 0.05 or < 0.01 for poor performers, qualify associated non-detects unusable (R) and associated positive results estimated (J).

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance the analytes that fail %RSD and/or RRF criteria.

12.4 Are there any transcription/calculation errors in

YES NO N/A

. . . .

the reporting of RRFs, RRFs or %RSD values? (Check at least 2 values, but if errors are found, check more.) ___ [✓] ___

ACTION: Circle errors in red.

ACTION: If errors are large, contact the TOPO to obtain an explanation/resubmittal from the lab, document in the Data Assessment under Contract Problems/Non-Compliance.

13.0 GC/MS Continuing Calibration Verification (CCV) (Form VII)

13.1 Are the Continuing Calibration Forms (Form VII) present and complete for the volatile fraction? [✓] ___ ___

13.2 Did the 12 hour clock begin with either the injection of BFB or in cases where a closing CCV can be used as an opening CCV for each instrument? [✓] ___ ___

ACTION: If any forms are missing or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, ask the TOPO to obtain explanation/resubmittal from the laboratory. If continuing calibration data are unavailable, flag all associated sample data as unusable (R).

13.3 Do any volatile compounds have a % Difference (% D) between the initial RRF and CCV RRF exceeding ± 50% for 1,4-Dioxane, ± 40% for the poor performers or ± 25% for the remaining compounds? ✓ [ ] ___

ACTION: Circle all outliers in red.

13.4 Do any volatile compounds have a RRF < 0.05 or < 0.01 for the poor performers? ✓ [ ] ___

ACTION: Circle all outliers in red.

Note: Verify that the CCV was run at the required frequency (an opening and closing CCV must be run within 12-hour period) and the CCV was compared to the correct initial calibration. If the mid-point standard from the initial calibration is used as an opening CCV, verify that the result (RRF) of the mid-point standard was compared to the average RRF from the correct initial calibration.

Note: The closing CCV used to bracket the end of a 12-hour analytical sequence may be used as the opening CCV for the new 12-hour analyical sequence, provided that all the technical acceptance criteria are met for an opening CCV (see table below). If the closing CCV does not meet the technical acceptance criteria for an opening CCV, then a BFB tune followed by an opening CCV is required and the next 12-hour time period begins with the BFB tune.

Action: Use the following table to qualify data based on the technical acceptance criteria for the opening CCV and closing CCV.

YES NO N/A

Continuing Calibration Verification (CCV) Actions for Low/Medium Volatiles Analyses

Criteria for Opening CCV	Criteria for Closing CCV	Action	
		Detected Associated Compounds	**Non-Detected Associated Compounds**
RRF < 0.010 (poor responders) RRF < 0.050 (all other volatile target compounds)	RRF < 0.010 (for all volatile target compounds)	J	R
RRF ≥ 0.010 (poor responders) RRF ≥ 0.050 (for all other compounds)	RRF ≥ 0.010 (for all target volatile compounds)	No Action	
%D > 50.0 or < -50.0 (1,4-Dioxane) %D > 40.0 or < -40.0 (poor responders) %D > 25.0 or < -25.0 (all other volatile target compounds)	%D > 50.0 or < -50.0 (for all volatile target compounds)	J	UJ
%D ≤ 50.0 or ≥ -50.0 (1,4-Dioxane) %D ≤ 40.0 or ≥ -40.0 (poor responders) %D ≤ 25.0 or ≥ -25.0 (all other volatile target compounds)	%D ≤ 50.0 or ≥ -50.0 (for all volatile target compounds)	No Action	
Opening CCV not performed at required frequency *	Closing CCV not performed at required frequency *	R	

* See section 13.2 above

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance if more than two of the required analytes failed the above acceptance criteria.

13.5 Are there any transcription/calculation errors for the reporting of RRFs, or %D between initial RRFs and continuing RRFs? (Check at least two values but if errors are found, check more.) ___ [/] ___

ACTION: Circle errors with red pencil.

ACTION: If errors are large, notify the TOPO to obtain explanation/resubmittals from the lab. Document errors in the Contract Problems/Non-Compliance section of the Data Assessment.

. . . .

Note: All DMCs must meet RRF ≥ 0.010. No qualification of the data is necessary on the DMCs RRF and %RSD/%Diff data <u>alone</u>. However, use professional judgment to evaluate the DMC and %RSD/% Diff data in conjunction with the DMC recoveries to determine the need of qualification of the data.

14.0 <u>Internal Standard (Form VIII)</u>

14.1 Were the internal standard area counts for every sample and blank within the range of 50.0% and 200.0% of its response in the most recent opening CCV standard calibration? [ ] ✓ ___

If no, were affected sample reanalyzed? [✓] ___ ___

ACTION: 1. Circle all outliers with red pencil.

14.2 Are the retention times of the internal standards in sample or blanks within ±30 seconds from the RT of the internal standard in the 12-hour associated calibration standard (opening CCV or mid-point standard from initial calibration)? [✓] ___ ___

Action: Use the following table to qualify the data:

<u>**INTERNAL STANDARDS ACTIONS FOR LOW/MEDIUM VOLATILES**</u>

Criteria	**ACTION**	
	Detected Associated Compounds *	**Non-detected Associated Compounds ***
Area counts ≥ 50% and ≤ 200% of 12-hour standard (opening CCV or mid-point standard from initial calibration)	No Action	
Area counts < 50% of 12-hour standard (opening CCV or mid-point standard from initial calibration)	J	R
Area counts > 200% of 12-hour standard (Opening CCV or mid-point standard from initial calibration)	J	No Action
RT difference > 30.0 seconds between samples and 12-hour standard (Opening CCV or mid-point standard from initial calibration)	R**	R
RT difference ≤ 30.0 seconds between samples and 12-hour standard (Opening CCV or mid-point standard from initial calibration)	No Action	

* For volatile compounds associated to each internal standard, see Table 3-Low/Medium Volatile Target Compounds and Deuterated Monitoring Compounds with Corresponding Internal Standards for Quantitation in SOM01.1, Exhibit D, available at:

. . . .

Http://www.epa.gov/superfund/programs/clp/som1.htm

** Examine the chromatographic profile for that sample to determine if any false positives or negatives exist. For shifts of a large magnitude, the reviewer may consider partial or total rejection of the data for that sample fraction. Detects should not need to be qualified as unusable "R" if the mass spectral are met.

NOTE: Contract Requirements: The SOM (section 11.4.1 page D-46/VOA Low/Medium states that any sample which fails the acceptance criteria for IS response must be reanalyzed.

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance any sample(s) which failed the above IS acceptance criteria.

15.0 Field Duplicates

15.1 Were any field duplicates submitted for Low Concentration VOA analysis? [ ] ✓ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between duplicate results must be addressed in the reviewer narrative. If large differences exist, contact the TOPO to confirm identification of field duplicates with the sampler.

Agnes Ng

From: "Rudolph, Elizabeth" <erudolph@fedcsc.com>
To: "Agnes Ng (E-mail)" <agnes_ng@mitkem.com>
Cc: "Adly Michael" <Michael.adly@epamail.epa.gov>; "Jennifer Feranda" <feranda.jennifer@epa.gov>
Sent: Friday, January 26, 2007 13:42
Subject: Region 02 | Case 36113 | Lab MITKEM | Issue Insufficient/inappropriate designation of laboratory QC | FINAL

Agnes,

This is Keri Schaffer, Beth is out of the office.

*** Summary Start ***

Issue: Sample number B3RW8, scheduled for VOA, is designated for laboratory QC, however the Scheduling Notification says laboratory QC is not required.
Resolution: In accordance with previous direction from Region 2, Region 2 only required MS/MSD on the Pest/PCB fraction for SOM01.1. The laboratory will note the issue in the SDG Narrative and proceed with the analysis of the samples.

*** Summary End ***

Please contact me if you have any questions,

Thank you,

Keri Schaffer for

Beth Rudolph
Computer Sciences Corporation (CSC)
erudolph@fedcsc.com
703-818-4215

-----Original Message-----
From: Agnes Ng [mailto:agnes_ng@mitkem.com]
Sent: Friday, January 26, 2007 1:26 PM
To: Rudolph, Elizabeth
Subject: Region 2 Case 36113 SDG B3RW0

Hi Beth,

This SDG is soil samples for VOA analysis. Sample B3RW8 is designated as laboratory QC. The scheduling notification form says laboratory is not required. Are we to perform laboratory QC for this sample?

Thanks,
Agnes Ng
CLP Project Manager
(p) 401-732-3400
(f) 401-732-3499
****

277

not the intended recipient, or the employee responsible for delivering the message to the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited. If you have received this communication in error, please notify us immediately by telephone at 401-732-3400.

Agnes Ng

From: "Rudolph, Elizabeth" <erudolph@fedcsc.com>
To: "Agnes Ng (E-mail)" <agnes_ng@mitkem.com>
Cc: "Adly Michael" <Michael.adly@epamail.epa.gov>; "Jennifer Feranda" <feranda.jennifer@epa.gov>
Sent: Friday, January 26, 2007 14:01
Subject: Region 2 | Case 36113 | Lab MITKEM | Issue Multiple | FINAL

Agnes,

This is Keri Schaffer, Beth is out of the office today.

*** Summary Start ***

- Non-standard matrix -

Issue 1: Aqueous VOA sample numbers B3RS7, B3RT6, B3RT9, B3RR6, B3RS0,B3RS1, B3RS4, B3RT0, B3RT3, B3RW2, B3RX5 and B3RX8 were received with sediment in the vials. The Sediment may interfere with the DMC recoveries.
Resolution 1: Per Region 2, the laboratory will do their best to avoid the sediment in the samples and note the issue in the SDG Narrative.

- Non-sampler Issues -

Issue 2: The samples were missing sample tags.
Resolution 2: In accordance with previous direction from Region 2, the laboratory will note the issue in the SDG Narrative and proceed with the analysis of the samples.

*** Summary End ***

Please contact me if you have any further questions.

Thank you,

Keri Schaffer for

Beth Rudolph
Computer Sciences Corporation (CSC)
erudolph@fedcsc.com
703-818-4215

-----Original Message-----
From: Michael.Adly@epamail.epa.gov [mailto:Michael.Adly@epamail.epa.gov]
Sent: Friday, January 26, 2007 1:38 PM
To: Rudolph, Elizabeth
Cc: feranda.jennifer@epa.gov
Subject: Re: New Issue #4 | Case 36113 | Lab MITKEM | Issue Multiple

30

0279

Keri,

Regarding issue #1, please advise the lab to proceed with the analysis of the samples, and do their best to avoid the sediment in the samples. This issue must be noted in the SDG narrative.

Thanks.

Adly A. Michael
Region 2 - HWSB - HWSS
Phone: (732) 906-6161
Fax: (732) 321-6622

"Rudolph, Elizabeth" <erudolph@fedcsc.com>
01/26/2007 12:59 PM

To
Adly Michael/R2/USEPA/US@EPA, Jennifer Feranda/R2/USEPA/US@EPA

cc

Subject
New Issue #4 | Case 36113 | Lab MITKEM | Issue Multiple

Adly,

This is Keri Schaffer, Beth is out of the office today.

MITKEM has reported the following issues. Issue 2 may be resolved using a standard answer. Please advise on how the lab should proceed for issue 1.

- Non-standard matrix -

Issue 1: Aqueous VOA sample numbers B3RS7, B3RT6, B3RT9, B3RR6, B3RS0, B3RS1, B3RS4, B3RT0, B3RT3, B3RW2, B3RX5 and B3RX8 were received with sediment in the vials. The Sediment may interfere with the DMC recoveries.

- Non-sampler -

Issue 2: The samples were missing sample tags.
Resolution 2: In accordance with previous direction from Region 2, the laboratory will note the issue in the SDG Narrative and proceed with the analysis of the samples.

Please contact me if you have any questions.

Thank you,

31

Keri Schaffer for

Beth Rudolph
Computer Sciences Corporation (CSC)
erudolph@fedcsc.com
703-818-4215

-----Original Message-----
From: Agnes Ng [mailto:agnes_ng@mitkem.com]
Sent: Friday, January 26, 2007 12:41 PM
To: Rudolph, Elizabeth
Subject: Region 2 Case 36113 Case B3RS7

Hi Beth,

1. For the following aqueous samples scheduled for VOA analysis, there was sediment in all the vials for each sample: B3RS7, B3RT6, B3RT9, B3RR6, B3RS0, B3RS1, B3RS4, B3RT0, B3RT3, B3RW2, B3RX5 and B3RX8. The sediment in the vials may interfere with DMC recoveries.

2. We did not receive any tags with the samples.

Thanks,
Agnes Ng
CLP Project Manager
(p) 401-732-3400
(f) 401-732-3499
****

RECORD OF COMMUNICATION
REGIONAL SAMPLE CONTROL CENTER

DATE: 2/7/2007 TDF # 06-0400
SUBJECT: CLP Data Package for Quality Assurance Review
FROM: Hazardous Waste Support Section
TO: ESAT/RSCC

Attached is the following ORGANIC Data Package to be reviewed for Quality Assurance

SITE: Wallace International CASE #: 36113

SDG#: B3RS5, B3RS7, B3RWØ SAMPLER: W-SAT

PROJ. CODE: QB SITE SPILL #: ZZ	#SAMPLES	MATRIX
LAB: MITKEM OPERABLE UNIT: 00	18	Water
TURN-AROUND-TIME: 7 day	32	Soil
CERCLIS ID #: PRN000206029	FRACTION:	VOA

Contaminant(s) of Concern (If known)

REGION II RSCC DATA TRANSFER LOG

Relinquished By		Received By	
Signature	Date/Time	Signature	Date/Time
[signature]	2/12/07 9:45 Am	[signature]	2-12-07 9:45 Am
[signature] B3RS7	2/13/07	John Bulich B3RS7	2-13-07
John Bulich B3RS7	2/16/07	C-Stanco B3RS7	2/16/07
[signature] B3RWO	2-13-07	[signature] B3RWO	2/13/07
[signature] B3RWO	2/16/07	C-Stanco B3RWO	2/16/07
[signature] B3RS5	2-14-07	CMAe B3RS5	2/14/07
CMAe B3RS5	2/16/07 B3RS5	C-Stanco B3RS5	2/16/07
C-Stanco All SDGs	2/16/07 2:20pm	[signature]	2/16/07 2:20pm
[signature]	2/16/07 2:25pm	Hanif Sheikh	2/16/07 2:25
Hanif Sheikh	2/16/07 4:16PM	C-Stanco	2/16/07 4:16pm
C-Stanco	2/16/07	Hanif Sheikh	2/16/07

Functional Guidelines for Evaluating Organic Analysis

CASE No.: 36113
LABORATORY: MITKEM
SAMPLER: W-SAT

SDG No.: B3RW0
SITE: Wallace International Site
ANALYSIS: LOW/MED VOA

DATA ASSESSMENT

The current SOP HW-33A/VOA (Revision 0) April 2006, USEPA Region II Data Validation SOP for Statement of Work SOM01.1 for evaluating organic data has been applied.

All data are valid and acceptable except those analytes rejected "R"(unusable). Due to the detection of QC problems, some analytes may have the "J" (estimated), "N"(presumptive evidence for the presence of the material), "U" (non-detect) or "JN" (presumptive evidence for the presence of the material at an estimated value) flag. All action is detailed on the attached sheets.

The "R" flag means that the associated value is unusable. In other words, significant data bias is evident and the reported analyte concentration is unreliable.

Reviewer's Signature: Shobitha Amin — Date: February / 15 / 2007

Peer Reviewer's Signature: C. Harris — Date: 2 / 15 / 2007

Verified By: J Karidas — Date: 02 / 16 /2007

SDG#B3RW0

1. HOLDING TIME:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded.
The following action was taken in the samples and analytes shown due to excessive holding time.

No problems found for this criteria.

2. DMC's

All samples are spiked with surrogate compounds (DMC's) prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate concentrations were outside contract specifications, qualifications were applied to the samples and analytes as shown below.

VDSS3-The following volatile samples have DMC/SMC recoveries above the upper limit of the criteria window. Detected compounds are qualified J. Nondetected compounds are not qualified.

Benzene-d6 B3RW3, B3RW6, B3RW6RE, B3RW7, B3RW7RE, B3RX0, B3RX0RE, B3RX6

Benzene

1,4-Dioxane-d8 B3RW6RE, B3RW7RE, B3RX0RE, B3RX3, VHBLK5N

1,4-Dioxane

Chloroethane-d5 B3RW7RE, B3RX0RE

Bromomethane, Carbon disulfide, Chloroethane, Chloromethane, Dichlorodifluoromethane

Toluene-d8 B3RW7, B3RX0, B3RX0RE, B3RX6

Ethylbenzene, Isopropylbenzene, Styrene, Tetrachloroethene, Toluene, Trichloroethene, m,p-Xylene, o-Xylene

1,2-Dichloropropane-d6 B3RW3, B3RW6, B3RW6RE, B3RW7, B3RW7RE, B3RX0, B3RX0RE, B3RX6

1,2-Dichloropropane, Bromodichloromethane, Cyclohexane, Methylcyclohexane

VDSS4-The following volatile samples have one or more DMC/SMC recovery values is less than the primary lower limit but greater than or equal to the expanded lower limit of the criteria window. Detected compounds are qualified J. Nondetected compounds are qualified UJ.

trans-1,3-Dichloropropene-d4 B3RX0

1,1,2-Trichloroethane, cis-1,3-Dichloropropene, trans-1,3-Dichloropropene

VDSS5-The following volatile samples have DMC/SMC recoveries below the expanded lower limit of the criteria window. Detected compounds are qualified J. Nondetected compounds are qualified R.

2-Butanone-d5 B3RW0, B3RW6, B3RW7

2-Butanone, Acetone

2-Hexanone-d5 B3RW6, B3RW7

2-Hexanone, 4-Methyl-2-pentanone

3. **MATRIX SPIKE/SPIKE DUPLICATE, MS/MSD:**

The MS/MSD data are generated to determine the long-term precision and accuracy of the analytical method in various matrices. The MS/MSD may be used in conjunction with other QC criteria for additional qualification of data.

Not applicable.

4. **BLANK CONTAMINATION:**

Quality assurance (QA) blanks, i.e., method, trip, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Trip blanks measure cross-contamination of samples during shipment. Field and rinse blanks measure cross-contamination of samples during field operations. If the concentration of the analyte is less than 1 times the blank contaminant level (2 times for common contaminants), the analytes are qualified as non-detects "U". The following analytes in the sample shown were qualified with "U" for these reasons:

A) **Method blank contamination:**
No problems found for this criteria.

B) **Field or rinse blank contamination:**
Samples are not qualified based on field blank contamination.

C) **Trip blank contamination for VOA aqueous samples:**
Samples are not qualified based on trip blank contamination.

D) **Storage Blank associated with VOA samples only:**
No problems found for this criteria.

E) **Tics "R" rejected:**
None.

5. **MASS SPECTROMETER TUNING:**

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances. The tuning standard for volatile organics is (BFB) Bromofluorobenzene.

If the mass calibration is in error, all associated data will be classified as unusable "R".

No problems found for this criteria.

6. **CALIBRATION:**

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration checks document that the instrument is giving satisfactory daily performance.

A) Response Factor GC/MS:

The response factor measures the instrument's response to specific chemical compounds. The response factor for the Target Compound List (TCL) must be ≥ 0.05, and ≥ 0.01 for the twenty-two analytes with poor response in both the initial and continuing calibrations. A value < 0.05, or < 0.01 for the poor performers indicates a serious detection and quantitation problem (poor sensitivity). Analytes detected in the sample will be qualified as estimated, "J". All non-detects for that compound will be rejected "R".

The following volatile samples are associated with a initial, continuing and a closing calibration relative response factor (RRF50) outside primary criteria. Hits are flagged "J" and non-detects are qualified "R".

1,4-Dioxane:

B3RW0, B3RW1, B3RW3, B3RW6, B3RW6RE, B3RW7, B3RW7RE, B3RW8, B3RX0, B3RX0RE, B3RX1, B3RX3, B3RX4, B3RX6, B3RX7 , VBLK5G, VBLK5L, VHBLK5N

The following volatile samples are associated with an initial, continuing calibration and closing calibration in which a SMC/DMC did not meet relative response factor (RRF) criteria. Associated hits are flagged "J" and non-detects are qualified "R".

****1,4-Dioxane-d8**
B3RW0, B3RW1, B3RW3, B3RW6, B3RW6RE, B3RW7, B3RW7RE, B3RW8, B3RX0, B3RX0RE, B3RX1, B3RX3, B3RX4, B3RX6, B3RX7, VBLK5G, VBLK5L, VHBLK5N

** - 1,4-Dioxane has already been qualified "R" based on Average Response factor.

B) Percent Relative Standard Deviation (%RSD) and Percent Difference (%D):

Percent RSD is calculated from the initial calibration and is used to indicate the stability of the specific compound response factor over increasing concentration. Percent D compares the response factor of the continuing calibration check to the mean response factor (RRF) from the initial calibration. Percent D is a measure of the instrument's daily performance. Percent RSD must be < 20%, < 40% for the poor performers, and < 50% for 1,4-Dioxane. %D must be < 25%, < 40% for the poor performers, and < 50% for 1,4-Dioxane. A value outside of these limits indicates potential detection and quantitation errors. For these reasons, all positive results are flagged as estimated, "J" and non-detects are flagged "UJ". If %RSD and %D grossly exceed QC criteria (> 90%), non-detects data may be qualified "R".

VC8-The following volatile samples are associated with an opening or closing CCV percent difference (%D) outside criteria. Detected compounds are qualified J. Nondetected compounds are qualified UJ.

B3RW0, B3RW1, B3RW3, B3RW6, B3RW7, B3RW8, B3RX0, B3RX1, B3RX4, B3RX6, B3RX7, VBLK5G

4-Methyl-2-pentanone VSTD0505H

2-Hexanone VSTD0505H

1,2-Dibromo-3-chloropropane VSTD0505H

8. INTERNAL STANDARDS PERFORMANCE GC/MS:

Internal standards (IS) performance criteria ensure that the GC/MS sensitivity and response are stable during every experimental run. The internal standard area count must not vary by more than a factor of 2 (-50% to +200%) from the associated continuing calibration standard. The retention time of the internal standard must not vary more than "30 seconds from the associated continuing calibration standard. If the area count is outside the (-50% to +200%) range of the associated standard, all of the positive results for compounds quantitated using that IS are qualified as estimated, "J", and all non-detects as "UJ", or "R" if there is a severe loss of sensitivity.

If an internal standard retention time varies by more than 30 seconds, the reviewer will use professional judgment to determine either partial or total rejection of the data for that sample fraction.

VIS31-The following volatile samples have internal standard area counts that are outside the lower limit of primary criteria. Detected compounds are qualified J. Nondetected compounds are qualified R.

1,4-Dichlorobenzene-d4 B3RW6RE, B3RW7RE, B3RX0RE

9. COMPOUND IDENTIFICATION:

A) Volatile Fraction:

TCL compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and by comparison to the ion spectra obtained from known standards. For the results to be a positive hit, the sample peak must be within " 0.06 RRT units of the standard compound and have an ion spectra which has a ratio of the primary and secondary m/e intensities within 20% of that in the standard compound. For the tentatively identified compounds (TIC) the ion spectra must match accurately. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

No problems found for this qualification.

10. CONTRACT PROBLEMS NON-COMPLIANCE:

1,4-Dioxane :

Average response factor (RRF) is below Contractual criteria in the initial calibration.
Continuing response factor (RF5.0) is below Contractual criteria in all the opening and closing CCV calibrations.

1,4-Dioxane-d8 :

Average response factor (RRF) is below Contractual criteria in the initial calibration.
Continuing response factor (RF5.0) is below Contractual criteria in all the opening and closing CCV calibrations.

11. FIELD DOCUMENTATION:

12. OTHER PROBLEMS:

13. This package contains reextractions, reanalyses or dilutions. Upon reviewing the QA results, the following Form 1(s) are identified NOT to be used.

B3RW6RE, B3RW7RE, B3RX0RE

RECEIVED
FEB 0 1 2007
HAZ. WASTE SUPPORT SEC.

SDG Narrative

Mitkem Corporation submits the enclosed data package in response to USEPA Case # 36113 and SDG# B3RW0. Analyses were performed for twelve soil samples that were received on January 25, 2007. The analyses were performed under USEPA Contract # EP-W-05-030. Please note that the sample-shipping cooler received on January 25 was measured at 3°C.

Sample B3RW8 was designated as the sample for laboratory QC on the TR/COC. The scheduling notification says laboratory QC is not required. Per the Region, laboratory QC is only required for the Pesticides/Aroclor fractions.

No sample tags were received with the samples. Per the Region, proceed with analysis of the samples.

The following samples are submitted in this data package:

Client ID	Lab ID	Analysis
B3RW0	F0093-01B	V
B3RW1	F0093-02B	V
B3RW3	F0093-03B	V
B3RW6	F0093-04B	V
B3RW6RE	F0093-04BRA	V
B3RW7	F0093-05B	V
B3RW7RE	F0093-05BRA	V
B3RW8	F0093-06B	V
B3RX0	F0093-07B	V
B3RX0RE	F0093-07BRA	V
B3RX1	F0093-08B	V
B3RX3	F0093-09B	V
B3RX4	F0093-10B	V
B3RX6	F0093-11B	V
B3RX7	F0093-12B	V

V = Volatiles

The analyses were performed using USEPA CLP Multi-Media, Multi-Concentration (SOM01.1) protocols. The analyses were performed with strict adherence to the SOW with the following exceptions and observations:

1. Overall Observation:

Where needed, manual integrations were performed to improve data quality. The corrections were reviewed and associated hardcopies generated and reported as required. Manual integrations are coded to provide the data reviewer justification for such action. The codes are labeled on the ion chromatogram signal (GC/MS signal) and chromatogram for GC based analysis as follows:

- M1 peak tailing or fronting.
- M2 peak co-elution.
- M3 rising or falling baseline.
- M4 retention time shift.
- M5 miscellaneous – under this category, the justification is explained.

2. Volatile Analysis:

Trap used for instrument V5: OI Analytical #10 trap containing 8 cm each of Tenax, silica gel and carbon molecular sieve.

GC column used: 30 m x 0.25 mm id (1.4 um film thickness) DB-624 capillary column.

cis-1,3-Dichloropropene-d4 was detected in method blanks and in samples. The volatile organic deuterated monitoring compound spike solution contains both the cis- and trans-1,3-dichloropropene isomers. cis-1,3-Dichloropropene-d4 is not a dueterated monitoring compound for SOM01.1, while the trans isomer is. The cis isomer is considered a laboratory artifact, and is not reported as a tentatively identified compound.

The following equation was used to calculate the concentration of target analytes for soil samples:

$$\text{Concentration } (\mu g/Kg) = \frac{(Amt)(DF)(UF)(5)}{\left(\frac{Ws * (100 - M)}{100}\right)}$$

where: Amt = CAL – AMT on raw data
DF = Dilution factor
UF = ng unit correction factor
Ws = Weight of sample extracted (g)
M = %moisture (not decanted)

41

The soil samples were received in Encore samplers. The samples were extruded into unpreserved VOA vials and kept frozen until time of analysis.

DMC recoveries were within the QC limits with the exception of the following: low recovery of 2-butanone-d5 in sample B3RW0, high recovery of benzene-d6 and 1,2-dichloropropane-d6 in sample B3RW3, low recovery of 2-butanone-d5 and 2-hexanone-d5 and high recovery of benzene-d6 and 1,2-dichloropropane-d6 in sample B3RW6, low recovery of 2-butanone-d5 and 2-hexanone-d5 and high recovery of benzene-d6, 1,2-dichloropropane-d6 and toluene-d8 in sample B3RW7, high recovery of benzene-d6, 1,2-dichloropropane-d6 and toluene-d8 and low recovery of trans-1,3-dichloropropene-d4 in sample B3RX0, high recovery of benzene-d6, 1,2-dichloropropane-d6 and toluene-d8 in sample B3RX6 and high recovery of 1,4-dioxane-d8 in sample B3RX3 and holding blank VHBLK5N. Matrix interference confirmed on DMC recoveries as samples B3RW6, B3RW7 and B3RX0 were re-analyzed with similar findings.

No manual integrations were performed.

For 1,4-dioxane and 1,4-dioxane-d8, the laboratory was unable to achieve the minimum average RRF of 0.0050 for both the initial calibration as well as the opening and closing calibration verifications. In our experience, this compound will not reliably achieve the SOM method performance criteria due to its high water solubility. Please note that a better approach is to analyze this as an extractable semivolatile organic compound.

Internal standard area counts were within QC criteria with the exception of samples B3RW6RE, B3RW7RE and B3RX0RE. Internal standard area counts are within QC criteria in the initial analyses.

In standard VSTD0505H, 1,2-dibromo-3-chloropropane exceeded the closing CCV QC criteria.

No other unusual observation was made for the analysis.

All of the submittals to the region are originals other than logbook pages. Photocopies of logbook pages are included, with the originals maintained on file at the laboratory. Tunes, calibration verifications and initial calibrations that are shared among several cases are photocopies indicating the location of the originals.

I certify that this Sample Data Package is in compliance with the terms and condition of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy Sample Data Package and in the electronic data deliverable has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Agnes R Ng

Agnes Ng
CLP Project Manager
01/31/07

RECEIVED
FEB 01 2007
HAZ. WASTE SUPPORT SEC.

Contract Laboratory Program

Sample Delivery Group (SDG)
Cover Sheet

SDG Number B3RW0

Laboratory Name	Mitkem Coroporation	Lab Code	MITKEM
Contract No.	EP-W-05-030	Case No.	36113
Analysis Price	$ 0.00	SDG Turnaround	7 days

EPA Sample Numbers in SDG (Listed in Numerical Order)

01) B3RW0	08) B3RX1		
02) B3RW1	09) B3RX3		
03) B3RW3	10) B3RX4		
04) B3RW6	11) B3RX6		
05) B3RW7	12) B3RX7		
06) B3RW8			
07) B3RX0			

First Sample in SDG: B3RW0

Last Sample in SDG: B3RX7

First Sample Receipt Date: 01/25/2007

Last Sample Receipt Date: 01/25/2007

Note: There are a maximum of 20 field samples [excluding Performance Evaluation (PE) samples in an SDG. Attach the TR/COC Records to this form in alphanumeric order (the order listed above on this form).

Signature AgnesRNg Date 01/26/2007

44

0005

509

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RW0

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0093-01B

Sample wt/vol: 5.40 (g/mL) G Lab File ID: V5H4901.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. 25 Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6.2	U
74-87-3	Chloromethane	6.2	U
75-01-4	Vinyl chloride	6.2	U
74-83-9	Bromomethane	6.2	U
75-00-3	Chloroethane	6.2	U
75-69-4	Trichlorofluoromethane	6.2	U
75-35-4	1,1-Dichloroethene	6.2	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	6.2	U
67-64-1	Acetone	12	~~U~~ R
75-15-0	Carbon disulfide	6.2	U
79-20-9	Methyl acetate	6.2	U
75-09-2	Methylene chloride	6.2	U
156-60-5	trans-1,2-Dichloroethene	6.2	U
1634-04-4	Methyl tert-butyl ether	6.2	U
75-34-3	1,1-Dichloroethane	6.2	U
156-59-2	cis-1,2-Dichloroethene	6.2	U
78-93-3	2-Butanone	12	~~U~~ R
74-97-5	Bromochloromethane	6.2	U
67-66-3	Chloroform	6.2	U
71-55-6	1,1,1-Trichloroethane	6.2	U
110-82-7	Cyclohexane	6.2	U
56-23-5	Carbon tetrachloride	6.2	U
71-43-2	Benzene	6.2	U
107-06-2	1,2-Dichloroethane	6.2	U
123-91-1	1,4-Dioxane	120	~~U~~ R

45

509

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RW0

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0093-01B

Sample wt/vol: 5.40 (g/mL) G Lab File ID: V5H4901.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. 25 Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	6.2	U
108-87-2	Methylcyclohexane	6.2	U
78-87-5	1,2-Dichloropropane	6.2	U
75-27-4	Bromodichloromethane	6.2	U
10061-01-5	cis-1,3-Dichloropropene	6.2	U
108-10-1	4-Methyl-2-pentanone	12	U J
108-88-3	Toluene	6.2	U
10061-02-6	trans-1,3-Dichloropropene	6.2	U
79-00-5	1,1,2-Trichloroethane	6.2	U
127-18-4	Tetrachloroethene	6.2	U
591-78-6	2-Hexanone	12	U J
124-48-1	Dibromochloromethane	6.2	U
106-93-4	1,2-Dibromoethane	6.2	U
108-90-7	Chlorobenzene	6.2	U
100-41-4	Ethylbenzene	6.2	U
179601-23-1	m,p-Xylene	6.2	U
95-47-6	o-Xylene	6.2	U
100-42-5	Styrene	6.2	U
75-25-2	Bromoform	6.2	U
98-82-8	Isopropylbenzene	6.2	U
79-34-5	1,1,2,2-Tetrachloroethane	6.2	U
541-73-1	1,3-Dichlorobenzene	6.2	U
106-46-7	1,4-Dichlorobenzene	6.2	U
95-50-1	1,2-Dichlorobenzene	6.2	U
96-12-8	1,2-Dibromo-3-chloropropane	6.2	U J
120-82-1	1,2,4-Trichlorobenzene	6.2	U
87-61-6	1,2,3-Trichlorobenzene	6.2	U

S09

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RW0

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0093-01B

Sample wt/vol: 5.40 (g/mL) G Lab File ID: V5H4901.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. 25 Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1]EPA-designated Registry Number.

5509

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RW1

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0093-02B

Sample wt/vol: 5.10 (g/mL) G Lab File ID: V5H4902.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. 30 Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	7.0	U
74-87-3	Chloromethane	7.0	U
75-01-4	Vinyl chloride	7.0	U
74-83-9	Bromomethane	7.0	U
75-00-3	Chloroethane	7.0	U
75-69-4	Trichlorofluoromethane	7.0	U
75-35-4	1,1-Dichloroethene	7.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	7.0	U
67-64-1	Acetone	14	U
75-15-0	Carbon disulfide	7.0	U
79-20-9	Methyl acetate	7.0	U
75-09-2	Methylene chloride	7.0	U
156-60-5	trans-1,2-Dichloroethene	7.0	U
1634-04-4	Methyl tert-butyl ether	7.0	U
75-34-3	1,1-Dichloroethane	7.0	U
156-59-2	cis-1,2-Dichloroethene	7.0	U
78-93-3	2-Butanone	14	U
74-97-5	Bromochloromethane	7.0	U
67-66-3	Chloroform	7.0	U
71-55-6	1,1,1-Trichloroethane	7.0	U
110-82-7	Cyclohexane	7.0	U
56-23-5	Carbon tetrachloride	7.0	U
71-43-2	Benzene	7.0	U
107-06-2	1,2-Dichloroethane	7.0	U
123-91-1	1,4-Dioxane	140	~~U~~ R

48

5509

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3RW1

Lab Name: MITKEM CORPORATION — Contract: EP-W-05-030

Lab Code: MITKEM — Case No.: 36113 — Mod. Ref No.: — SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL — Lab Sample ID: F0093-02B

Sample wt/vol: 5.10 (g/mL) G — Lab File ID: V5H4902.D

Level: (TRACE/LOW/MED) LOW — Date Received: 01/25/2007

% Moisture: not dec. 30 — Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) — Dilution Factor: 1.0

Soil Extract Volume: (uL) — Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	7.0	U
108-87-2	Methylcyclohexane	7.0	U
78-87-5	1,2-Dichloropropane	7.0	U
75-27-4	Bromodichloromethane	7.0	U
10061-01-5	cis-1,3-Dichloropropene	7.0	U
108-10-1	4-Methyl-2-pentanone	14	U J
108-88-3	Toluene	7.0	U
10061-02-6	trans-1,3-Dichloropropene	7.0	U
79-00-5	1,1,2-Trichloroethane	7.0	U
127-18-4	Tetrachloroethene	7.0	U
591-78-6	2-Hexanone	14	U J
124-48-1	Dibromochloromethane	7.0	U
106-93-4	1,2-Dibromoethane	7.0	U
108-90-7	Chlorobenzene	7.0	U
100-41-4	Ethylbenzene	7.0	U
179601-23-1	m,p-Xylene	7.0	U
95-47-6	o-Xylene	7.0	U
100-42-5	Styrene	7.0	U
75-25-2	Bromoform	7.0	U
98-82-8	Isopropylbenzene	7.0	U
79-34-5	1,1,2,2-Tetrachloroethane	7.0	U
541-73-1	1,3-Dichlorobenzene	7.0	U
106-46-7	1,4-Dichlorobenzene	7.0	U
95-50-1	1,2-Dichlorobenzene	7.0	U
96-12-8	1,2-Dibromo-3-chloropropane	7.0	U J
120-82-1	1,2,4-Trichlorobenzene	7.0	U
87-61-6	1,2,3-Trichlorobenzene	7.0	U

49

5509

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3RW1

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0093-02B

Sample wt/vol: 5.10 (g/mL) G Lab File ID: V5H4902.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. 30 Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

50

0026

510

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RW3

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0093-03B

Sample wt/vol: 5.20 (g/mL) G Lab File ID: V5H4903.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. 25 Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6.4	U
74-87-3	Chloromethane	6.4	U
75-01-4	Vinyl chloride	6.4	U
74-83-9	Bromomethane	6.4	U
75-00-3	Chloroethane	6.4	U
75-69-4	Trichlorofluoromethane	6.4	U
75-35-4	1,1-Dichloroethene	6.4	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	6.4	U
67-64-1	Acetone	13	U
75-15-0	Carbon disulfide	6.4	U
79-20-9	Methyl acetate	6.4	U
75-09-2	Methylene chloride	6.4	U
156-60-5	trans-1,2-Dichloroethene	6.4	U
1634-04-4	Methyl tert-butyl ether	6.4	U
75-34-3	1,1-Dichloroethane	6.4	U
156-59-2	cis-1,2-Dichloroethene	6.4	U
78-93-3	2-Butanone	13	U
74-97-5	Bromochloromethane	6.4	U
67-66-3	Chloroform	6.4	U
71-55-6	1,1,1-Trichloroethane	6.4	U
110-82-7	Cyclohexane	6.4	U
56-23-5	Carbon tetrachloride	6.4	U
71-43-2	Benzene	6.4	U
107-06-2	1,2-Dichloroethane	6.4	U
123-91-1	1,4-Dioxane	130	~~U~~ R

51

SID

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3RW3

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0093-03B

Sample wt/vol: 5.20 (g/mL) G Lab File ID: V5H4903.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. 25 Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	6.4	U
108-87-2	Methylcyclohexane	6.4	U
78-87-5	1,2-Dichloropropane	6.4	U
75-27-4	Bromodichloromethane	6.4	U
10061-01-5	cis-1,3-Dichloropropene	6.4	U
108-10-1	4-Methyl-2-pentanone	13	U J
108-88-3	Toluene	6.4	U
10061-02-6	trans-1,3-Dichloropropene	6.4	U
79-00-5	1,1,2-Trichloroethane	6.4	U
127-18-4	Tetrachloroethene	6.4	U
591-78-6	2-Hexanone	13	U J
124-48-1	Dibromochloromethane	6.4	U
106-93-4	1,2-Dibromoethane	6.4	U
108-90-7	Chlorobenzene	6.4	U
100-41-4	Ethylbenzene	6.4	U
179601-23-1	m,p-Xylene	6.4	U
95-47-6	o-Xylene	6.4	U
100-42-5	Styrene	6.4	U
75-25-2	Bromoform	6.4	U
98-82-8	Isopropylbenzene	6.4	U
79-34-5	1,1,2,2-Tetrachloroethane	6.4	U
541-73-1	1,3-Dichlorobenzene	6.4	U
106-46-7	1,4-Dichlorobenzene	6.4	U
95-50-1	1,2-Dichlorobenzene	6.4	U
96-12-8	1,2-Dibromo-3-chloropropane	6.4	U J
120-82-1	1,2,4-Trichlorobenzene	6.4	U
87-61-6	1,2,3-Trichlorobenzene	6.4	U

52

510

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RW3

b Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0093-03B

Sample wt/vol: 5.20 (g/mL) G Lab File ID: V5H4903.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. 25 Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

(53)

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RW6

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0093-04B

Sample wt/vol: 5.00 (g/mL) G Lab File ID: V5H4904.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. 29 Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	7.0	U
74-87-3	Chloromethane	7.0	U
75-01-4	Vinyl chloride	7.0	U
74-83-9	Bromomethane	7.0	U
75-00-3	Chloroethane	7.0	U
75-69-4	Trichlorofluoromethane	7.0	U
75-35-4	1,1-Dichloroethene	7.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	7.0	U
67-64-1	Acetone	14	~~U~~ R
75-15-0	Carbon disulfide	7.0	U
79-20-9	Methyl acetate	7.0	U
75-09-2	Methylene chloride	7.0	U
156-60-5	trans-1,2-Dichloroethene	7.0	U
1634-04-4	Methyl tert-butyl ether	7.0	U
75-34-3	1,1-Dichloroethane	7.0	U
156-59-2	cis-1,2-Dichloroethene	7.0	U
78-93-3	2-Butanone	14	~~U~~ R
74-97-5	Bromochloromethane	7.0	U
67-66-3	Chloroform	7.0	U
71-55-6	1,1,1-Trichloroethane	7.0	U
110-82-7	Cyclohexane	7.0	U
56-23-5	Carbon tetrachloride	7.0	U
71-43-2	Benzene	7.0	U
107-06-2	1,2-Dichloroethane	7.0	U
123-91-1	1,4-Dioxane	140	~~U~~ R

54

5 11

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RW6

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0093-04B

Sample wt/vol: 5.00 (g/mL) G   Lab File ID: V5H4904.D

Level: (TRACE/LOW/MED) LOW   Date Received: 01/25/2007

% Moisture: not dec. 29   Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	7.0	U
108-87-2	Methylcyclohexane	7.0	U
78-87-5	1,2-Dichloropropane	7.0	U
75-27-4	Bromodichloromethane	7.0	U
10061-01-5	cis-1,3-Dichloropropene	7.0	U
108-10-1	4-Methyl-2-pentanone	14	~~U~~ R
108-88-3	Toluene	7.0	U
10061-02-6	trans-1,3-Dichloropropene	7.0	U
79-00-5	1,1,2-Trichloroethane	7.0	U
127-18-4	Tetrachloroethene	7.0	U
591-78-6	2-Hexanone	14	~~U~~ R
124-48-1	Dibromochloromethane	7.0	U
106-93-4	1,2-Dibromoethane	7.0	U
108-90-7	Chlorobenzene	7.0	U
100-41-4	Ethylbenzene	7.0	U
179601-23-1	m,p-Xylene	7.0	U
95-47-6	o-Xylene	7.0	U
100-42-5	Styrene	7.0	U
75-25-2	Bromoform	7.0	U
98-82-8	Isopropylbenzene	7.0	U
79-34-5	1,1,2,2-Tetrachloroethane	7.0	U
541-73-1	1,3-Dichlorobenzene	7.0	U
106-46-7	1,4-Dichlorobenzene	7.0	U
95-50-1	1,2-Dichlorobenzene	7.0	U
96-12-8	1,2-Dibromo-3-chloropropane	7.0	UJ
120-82-1	1,2,4-Trichlorobenzene	7.0	U
87-61-6	1,2,3-Trichlorobenzene	7.0	U

55

S11

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3RW6

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0093-04B

Sample wt/vol: 5.00 (g/mL) G   Lab File ID: V5H4904.D

Level: (TRACE or LOW/MED) LOW   Date Received: 01/25/2007

% Moisture: not dec. 29   Date Analyzed: 01/26/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG   Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

56

S11A

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RW7

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0093-05B

Sample wt/vol: 5.20 (g/mL) G Lab File ID: V5H4905.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. 30 Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6.9	U
74-87-3	Chloromethane	6.9	U
75-01-4	Vinyl chloride	6.9	U
74-83-9	Bromomethane	6.9	U
75-00-3	Chloroethane	6.9	U
75-69-4	Trichlorofluoromethane	6.9	U
75-35-4	1,1-Dichloroethene	6.9	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	6.9	U
67-64-1	Acetone	14	~~U~~ R
75-15-0	Carbon disulfide	6.9	U
79-20-9	Methyl acetate	6.9	U
75-09-2	Methylene chloride	6.9	U
156-60-5	trans-1,2-Dichloroethene	6.9	U
1634-04-4	Methyl tert-butyl ether	6.9	U
75-34-3	1,1-Dichloroethane	6.9	U
156-59-2	cis-1,2-Dichloroethene	6.9	U
78-93-3	2-Butanone	14	~~U~~ R
74-97-5	Bromochloromethane	6.9	U
67-66-3	Chloroform	6.9	U
71-55-6	1,1,1-Trichloroethane	6.9	U
110-82-7	Cyclohexane	6.9	U
56-23-5	Carbon tetrachloride	6.9	U
71-43-2	Benzene	6.9	U
107-06-2	1,2-Dichloroethane	6.9	U
123-91-1	1,4-Dioxane	140	~~U~~ R

57

S11A

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RW7

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0093-05B

Sample wt/vol: 5.20 (g/mL) G Lab File ID: V5H4905.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. 30 Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	6.9	U
108-87-2	Methylcyclohexane	6.9	U
78-87-5	1,2-Dichloropropane	6.9	U
75-27-4	Bromodichloromethane	6.9	U
10061-01-5	cis-1,3-Dichloropropene	6.9	U
108-10-1	4-Methyl-2-pentanone	14	~~U~~ R
108-88-3	Toluene	6.9	U
10061-02-6	trans-1,3-Dichloropropene	6.9	U
79-00-5	1,1,2-Trichloroethane	6.9	U
127-18-4	Tetrachloroethene	6.9	U
591-78-6	2-Hexanone	14	~~U~~ R
124-48-1	Dibromochloromethane	6.9	U
106-93-4	1,2-Dibromoethane	6.9	U
108-90-7	Chlorobenzene	6.9	U
100-41-4	Ethylbenzene	6.9	U
179601-23-1	m,p-Xylene	6.9	U
95-47-6	o-Xylene	6.9	U
100-42-5	Styrene	6.9	U
75-25-2	Bromoform	6.9	U
98-82-8	Isopropylbenzene	6.9	U
79-34-5	1,1,2,2-Tetrachloroethane	6.9	U
541-73-1	1,3-Dichlorobenzene	6.9	U
106-46-7	1,4-Dichlorobenzene	6.9	U
95-50-1	1,2-Dichlorobenzene	6.9	U
96-12-8	1,2-Dibromo-3-chloropropane	6.9	UJ
120-82-1	1,2,4-Trichlorobenzene	6.9	U
87-61-6	1,2,3-Trichlorobenzene	6.9	U

58

S11A

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3RW7

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0093-05B

Sample wt/vol: 5.20 (g/mL) G Lab File ID: V5H4905.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. 30 Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

(59)

SS 11

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RW8

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0093-06B

Sample wt/vol: 5.00 (g/mL) G Lab File ID: V5H4906.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. 18 Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6.1	U
74-87-3	Chloromethane	6.1	U
75-01-4	Vinyl chloride	6.1	U
74-83-9	Bromomethane	6.1	U
75-00-3	Chloroethane	6.1	U
75-69-4	Trichlorofluoromethane	6.1	U
75-35-4	1,1-Dichloroethene	2.6	J
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	6.1	U
67-64-1	Acetone	12	U
75-15-0	Carbon disulfide	6.1	U
79-20-9	Methyl acetate	6.1	U
75-09-2	Methylene chloride	6.1	U
156-60-5	trans-1,2-Dichloroethene	6.1	U
1634-04-4	Methyl tert-butyl ether	6.1	U
75-34-3	1,1-Dichloroethane	6.1	U
156-59-2	cis-1,2-Dichloroethene	6.1	U
78-93-3	2-Butanone	12	U
74-97-5	Bromochloromethane	6.1	U
67-66-3	Chloroform	6.1	U
71-55-6	1,1,1-Trichloroethane	6.1	U
110-82-7	Cyclohexane	6.1	U
56-23-5	Carbon tetrachloride	6.1	U
71-43-2	Benzene	6.1	U
107-06-2	1,2-Dichloroethane	6.1	U
123-91-1	1,4-Dioxane	120	~~U~~ R

60

5511

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RW8

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0093-06B

Sample wt/vol: 5.00 (g/mL) G   Lab File ID: V5H4906.D

Level: (TRACE/LOW/MED) LOW   Date Received: 01/25/2007

% Moisture: not dec. 18   Date Analyzed: 01/26/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	6.1	U
108-87-2	Methylcyclohexane	6.1	U
78-87-5	1,2-Dichloropropane	6.1	U
75-27-4	Bromodichloromethane	6.1	U
10061-01-5	cis-1,3-Dichloropropene	6.1	U
108-10-1	4-Methyl-2-pentanone	12	U J
108-88-3	Toluene	6.1	U
10061-02-6	trans-1,3-Dichloropropene	6.1	U
79-00-5	1,1,2-Trichloroethane	6.1	U
127-18-4	Tetrachloroethene	140	
591-78-6	2-Hexanone	12	U J
124-48-1	Dibromochloromethane	6.1	U
106-93-4	1,2-Dibromoethane	6.1	U
108-90-7	Chlorobenzene	6.1	U
100-41-4	Ethylbenzene	6.1	U
179601-23-1	m,p-Xylene	6.1	U
95-47-6	o-Xylene	6.1	U
100-42-5	Styrene	6.1	U
75-25-2	Bromoform	6.1	U
98-82-8	Isopropylbenzene	6.1	U
79-34-5	1,1,2,2-Tetrachloroethane	6.1	U
541-73-1	1,3-Dichlorobenzene	6.1	U
106-46-7	1,4-Dichlorobenzene	6.1	U
95-50-1	1,2-Dichlorobenzene	6.1	U
96-12-8	1,2-Dibromo-3-chloropropane	6.1	U J
120-82-1	1,2,4-Trichlorobenzene	6.1	U
87-61-6	1,2,3-Trichlorobenzene	6.1	U

61

5511

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RW8

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0093-06B

Sample wt/vol: 5.00 (g/mL) G Lab File ID: V5H4906.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. 18 Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796 [1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

62

512

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RX0

Lab Name: MITKEM CORPORATION | Contract: EP-W-05-030

Lab Code: MITKEM | Case No.: 36113 | Mod. Ref No.: | SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL | Lab Sample ID: F0093-07B

Sample wt/vol: 5.40 (g/mL) G | Lab File ID: V5H4909.D

Level: (TRACE/LOW/MED) LOW | Date Received: 01/25/2007

% Moisture: not dec. 24 | Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) | Dilution Factor: 1.0

Soil Extract Volume: (uL) | Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6.1	U
74-87-3	Chloromethane	6.1	U
75-01-4	Vinyl chloride	6.1	U
74-83-9	Bromomethane	6.1	U
75-00-3	Chloroethane	6.1	U
75-69-4	Trichlorofluoromethane	6.1	U
75-35-4	1,1-Dichloroethene	6.1	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	6.1	U
67-64-1	Acetone	12	U
75-15-0	Carbon disulfide	6.1	U
79-20-9	Methyl acetate	6.1	U
75-09-2	Methylene chloride	6.1	U
156-60-5	trans-1,2-Dichloroethene	6.1	U
1634-04-4	Methyl tert-butyl ether	6.1	U
75-34-3	1,1-Dichloroethane	6.1	U
156-59-2	cis-1,2-Dichloroethene	6.1	U
78-93-3	2-Butanone	12	U
74-97-5	Bromochloromethane	6.1	U
67-66-3	Chloroform	6.1	U
71-55-6	1,1,1-Trichloroethane	6.1	U
110-82-7	Cyclohexane	6.1	U
56-23-5	Carbon tetrachloride	6.1	U
71-43-2	Benzene	6.1	U
107-06-2	1,2-Dichloroethane	6.1	U
123-91-1	1,4-Dioxane	120	~~U~~ R

512

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RX0

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0093-07B

Sample wt/vol: 5.40 (g/mL) G Lab File ID: V5H4909.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. 24 Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	6.1	U
108-87-2	Methylcyclohexane	6.1	U
78-87-5	1,2-Dichloropropane	6.1	U
75-27-4	Bromodichloromethane	6.1	U
10061-01-5	cis-1,3-Dichloropropene	6.1	U J
108-10-1	4-Methyl-2-pentanone	12	U J
108-88-3	Toluene	6.1	U
10061-02-6	trans-1,3-Dichloropropene	6.1	U J
79-00-5	1,1,2-Trichloroethane	6.1	U J
127-18-4	Tetrachloroethene	6.1	U
591-78-6	2-Hexanone	12	U J
124-48-1	Dibromochloromethane	6.1	U
106-93-4	1,2-Dibromoethane	6.1	U
108-90-7	Chlorobenzene	6.1	U
100-41-4	Ethylbenzene	6.1	U
179601-23-1	m,p-Xylene	6.1	U
95-47-6	o-Xylene	6.1	U
100-42-5	Styrene	6.1	U
75-25-2	Bromoform	6.1	U
98-82-8	Isopropylbenzene	6.1	U
79-34-5	1,1,2,2-Tetrachloroethane	6.1	U
541-73-1	1,3-Dichlorobenzene	6.1	U
106-46-7	1,4-Dichlorobenzene	6.1	U
95-50-1	1,2-Dichlorobenzene	6.1	U
96-12-8	1,2-Dibromo-3-chloropropane	6.1	U J
120-82-1	1,2,4-Trichlorobenzene	6.1	U
87-61-6	1,2,3-Trichlorobenzene	6.1	U

64

512

EPA SAMPLE NO.

B3RX0

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0093-07B

Sample wt/vol: 5.40 (g/mL) G Lab File ID: V5H4909.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. 24 Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

65

SS12

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RX1

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0093-08B

Sample wt/vol: 5.50 (g/mL) G Lab File ID: V5H4910.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. 10 Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	5.1	U
74-87-3	Chloromethane	5.1	U
75-01-4	Vinyl chloride	5.1	U
74-83-9	Bromomethane	5.1	U
75-00-3	Chloroethane	5.1	U
75-69-4	Trichlorofluoromethane	5.1	U
75-35-4	1,1-Dichloroethene	5.1	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.1	U
67-64-1	Acetone	10	U
75-15-0	Carbon disulfide	5.1	U
79-20-9	Methyl acetate	5.1	U
75-09-2	Methylene chloride	5.1	U
156-60-5	trans-1,2-Dichloroethene	5.1	U
1634-04-4	Methyl tert-butyl ether	5.1	U
75-34-3	1,1-Dichloroethane	5.1	U
156-59-2	cis-1,2-Dichloroethene	5.1	U
78-93-3	2-Butanone	10	U
74-97-5	Bromochloromethane	5.1	U
67-66-3	Chloroform	5.1	U
71-55-6	1,1,1-Trichloroethane	5.1	U
110-82-7	Cyclohexane	5.1	U
56-23-5	Carbon tetrachloride	5.1	U
71-43-2	Benzene	5.1	U
107-06-2	1,2-Dichloroethane	5.1	U
123-91-1	1,4-Dioxane	100	R

66

5512

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RX1

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0093-08B

Sample wt/vol: 5.50 (g/mL) G Lab File ID: V5H4910.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. 10 Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	5.1	U
108-87-2	Methylcyclohexane	5.1	U
78-87-5	1,2-Dichloropropane	5.1	U
75-27-4	Bromodichloromethane	5.1	U
10061-01-5	cis-1,3-Dichloropropene	5.1	U
108-10-1	4-Methyl-2-pentanone	10	U J
108-88-3	Toluene	5.1	U
10061-02-6	trans-1,3-Dichloropropene	5.1	U
79-00-5	1,1,2-Trichloroethane	5.1	U
127-18-4	Tetrachloroethene	5.1	U
591-78-6	2-Hexanone	10	U J
124-48-1	Dibromochloromethane	5.1	U
106-93-4	1,2-Dibromoethane	5.1	U
108-90-7	Chlorobenzene	5.1	U
100-41-4	Ethylbenzene	5.1	U
179601-23-1	m,p-Xylene	5.1	U
95-47-6	o-Xylene	5.1	U
100-42-5	Styrene	5.1	U
75-25-2	Bromoform	5.1	U
98-82-8	Isopropylbenzene	5.1	U
79-34-5	1,1,2,2-Tetrachloroethane	5.1	U
541-73-1	1,3-Dichlorobenzene	5.1	U
106-46-7	1,4-Dichlorobenzene	5.1	U
95-50-1	1,2-Dichlorobenzene	5.1	U
96-12-8	1,2-Dibromo-3-chloropropane	5.1	U J
120-82-1	1,2,4-Trichlorobenzene	5.1	U
87-61-6	1,2,3-Trichlorobenzene	5.1	U

67

5512

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3RX1

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0093-08B

Sample wt/vol: 5.50 (g/mL) G Lab File ID: V5H4910.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. 10 Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1]EPA-designated Registry Number.

(68)

513

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RX3

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0093-09B

Sample wt/vol: 5.80 (g/mL) G Lab File ID: V5H4981.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. 22 Date Analyzed: 01/29/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	5.5	U
74-87-3	Chloromethane	5.5	U
75-01-4	Vinyl chloride	5.5	U
74-83-9	Bromomethane	5.5	U
75-00-3	Chloroethane	5.5	U
75-69-4	Trichlorofluoromethane	5.5	U
75-35-4	1,1-Dichloroethene	5.5	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.5	U
67-64-1	Acetone	11	U
75-15-0	Carbon disulfide	5.5	U
79-20-9	Methyl acetate	5.5	U
75-09-2	Methylene chloride	5.5	U
156-60-5	trans-1,2-Dichloroethene	5.5	U
1634-04-4	Methyl tert-butyl ether	5.5	U
75-34-3	1,1-Dichloroethane	5.5	U
156-59-2	cis-1,2-Dichloroethene	5.5	U
78-93-3	2-Butanone	11	U
74-97-5	Bromochloromethane	5.5	U
67-66-3	Chloroform	5.5	U
71-55-6	1,1,1-Trichloroethane	5.5	U
110-82-7	Cyclohexane	5.5	U
56-23-5	Carbon tetrachloride	5.5	U
71-43-2	Benzene	5.5	U
107-06-2	1,2-Dichloroethane	5.5	U
123-91-1	1,4-Dioxane	110	~~U~~ R

64

513

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RX3

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0093-09B

Sample wt/vol: 5.80 (g/mL) G Lab File ID: V5H4981.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. 22 Date Analyzed: 01/29/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	5.5	U
108-87-2	Methylcyclohexane	5.5	U
78-87-5	1,2-Dichloropropane	5.5	U
75-27-4	Bromodichloromethane	5.5	U
10061-01-5	cis-1,3-Dichloropropene	5.5	U
108-10-1	4-Methyl-2-pentanone	11	U
108-88-3	Toluene	2.5	J
10061-02-6	trans-1,3-Dichloropropene	5.5	U
79-00-5	1,1,2-Trichloroethane	5.5	U
127-18-4	Tetrachloroethene	5.5	U
591-78-6	2-Hexanone	11	U
124-48-1	Dibromochloromethane	5.5	U
106-93-4	1,2-Dibromoethane	5.5	U
108-90-7	Chlorobenzene	5.5	U
100-41-4	Ethylbenzene	2.9	J
179601-23-1	m,p-Xylene	13	
95-47-6	o-Xylene	3.2	J
100-42-5	Styrene	5.5	U
75-25-2	Bromoform	5.5	U
98-82-8	Isopropylbenzene	5.5	U
79-34-5	1,1,2,2-Tetrachloroethane	5.5	U
541-73-1	1,3-Dichlorobenzene	5.5	U
106-46-7	1,4-Dichlorobenzene	5.5	U
95-50-1	1,2-Dichlorobenzene	5.5	U
96-12-8	1,2-Dibromo-3-chloropropane	5.5	U
120-82-1	1,2,4-Trichlorobenzene	5.5	U
87-61-6	1,2,3-Trichlorobenzene	5.5	U

70

513

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RX3

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0093-09B

Sample wt/vol: 5.80 (g/mL) G Lab File ID: V5H4981.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. 22 Date Analyzed: 01/29/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796 [1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

71

5513

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3RX4

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0093-10B

Sample wt/vol: 5.30 (g/mL) G Lab File ID: V5H4912.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. 32 Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6.9	U
74-87-3	Chloromethane	6.9	U
75-01-4	Vinyl chloride	6.9	U
74-83-9	Bromomethane	6.9	U
75-00-3	Chloroethane	6.9	U
75-69-4	Trichlorofluoromethane	6.9	U
75-35-4	1,1-Dichloroethene	6.9	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	6.9	U
67-64-1	Acetone	14	U
75-15-0	Carbon disulfide	6.9	U
79-20-9	Methyl acetate	6.9	U
75-09-2	Methylene chloride	6.9	U
156-60-5	trans-1,2-Dichloroethene	6.9	U
1634-04-4	Methyl tert-butyl ether	6.9	U
75-34-3	1,1-Dichloroethane	6.9	U
156-59-2	cis-1,2-Dichloroethene	6.9	U
78-93-3	2-Butanone	14	U
74-97-5	Bromochloromethane	6.9	U
67-66-3	Chloroform	6.9	U
71-55-6	1,1,1-Trichloroethane	6.9	U
110-82-7	Cyclohexane	6.9	U
56-23-5	Carbon tetrachloride	6.9	U
71-43-2	Benzene	6.9	U
107-06-2	1,2-Dichloroethane	6.9	U
123-91-1	1,4-Dioxane	140	UR

72

5513

EPA SAMPLE NO.

B3RX4

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: MITKEM CORPORATION | Contract: EP-W-05-030

Lab Code: MITKEM | Case No.: 36113 | Mod. Ref No.: | SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL | Lab Sample ID: F0093-10B

Sample wt/vol: 5.30 (g/mL) G | Lab File ID: V5H4912.D

Level: (TRACE/LOW/MED) LOW | Date Received: 01/25/2007

% Moisture: not dec. 32 | Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) | Dilution Factor: 1.0

Soil Extract Volume: (uL) | Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	6.9	U
108-87-2	Methylcyclohexane	6.9	U
78-87-5	1,2-Dichloropropane	6.9	U
75-27-4	Bromodichloromethane	6.9	U
10061-01-5	cis-1,3-Dichloropropene	6.9	U
108-10-1	4-Methyl-2-pentanone	14	U J
108-88-3	Toluene	6.9	U
10061-02-6	trans-1,3-Dichloropropene	6.9	U
79-00-5	1,1,2-Trichloroethane	6.9	U
127-18-4	Tetrachloroethene	6.9	U
591-78-6	2-Hexanone	14	U J
124-48-1	Dibromochloromethane	6.9	U
106-93-4	1,2-Dibromoethane	6.9	U
108-90-7	Chlorobenzene	6.9	U
100-41-4	Ethylbenzene	6.9	U
179601-23-1	m,p-Xylene	6.9	U
95-47-6	o-Xylene	6.9	U
100-42-5	Styrene	6.9	U
75-25-2	Bromoform	6.9	U
98-82-8	Isopropylbenzene	6.9	U
79-34-5	1,1,2,2-Tetrachloroethane	6.9	U
541-73-1	1,3-Dichlorobenzene	6.9	U
106-46-7	1,4-Dichlorobenzene	6.9	U
95-50-1	1,2-Dichlorobenzene	6.9	U
96-12-8	1,2-Dibromo-3-chloropropane	6.9	U J
120-82-1	1,2,4-Trichlorobenzene	6.9	U
87-61-6	1,2,3-Trichlorobenzene	6.9	U

73

5513

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RX4

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0093-10B

Sample wt/vol: 5.30 (g/mL) G   Lab File ID: V5H4912.D

Level: (TRACE or LOW/MED) LOW   Date Received: 01/25/2007

% Moisture: not dec. 32   Date Analyzed: 01/26/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG   Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796 [1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

74

514

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RX6

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0093-11B

Sample wt/vol: 4.50 (g/mL) G   Lab File ID: V5H4913.D

Level: (TRACE/LOW/MED) LOW   Date Received: 01/25/2007

% Moisture: not dec. 19   Date Analyzed: 01/26/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6.9	U
74-87-3	Chloromethane	6.9	U
75-01-4	Vinyl chloride	6.9	U
74-83-9	Bromomethane	6.9	U
75-00-3	Chloroethane	6.9	U
75-69-4	Trichlorofluoromethane	6.9	U
75-35-4	1,1-Dichloroethene	6.9	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	6.9	U
67-64-1	Acetone	14	U
75-15-0	Carbon disulfide	6.9	U
79-20-9	Methyl acetate	6.9	U
75-09-2	Methylene chloride	6.9	U
156-60-5	trans-1,2-Dichloroethene	6.9	U
1634-04-4	Methyl tert-butyl ether	6.9	U
75-34-3	1,1-Dichloroethane	6.9	U
156-59-2	cis-1,2-Dichloroethene	6.9	U
78-93-3	2-Butanone	14	U
74-97-5	Bromochloromethane	6.9	U
67-66-3	Chloroform	6.9	U
71-55-6	1,1,1-Trichloroethane	6.9	U
110-82-7	Cyclohexane	6.9	U
56-23-5	Carbon tetrachloride	6.9	U
71-43-2	Benzene	6.9	U
107-06-2	1,2-Dichloroethane	6.9	U
123-91-1	1,4-Dioxane	140	~~U~~ R

75

514

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RX6

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0093-11B

Sample wt/vol: 4.50 (g/mL) G Lab File ID: V5H4913.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. 19 Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	6.9	U
108-87-2	Methylcyclohexane	6.9	U
78-87-5	1,2-Dichloropropane	6.9	U
75-27-4	Bromodichloromethane	6.9	U
10061-01-5	cis-1,3-Dichloropropene	6.9	U
108-10-1	4-Methyl-2-pentanone	14	UJ
108-88-3	Toluene	6.9	U
10061-02-6	trans-1,3-Dichloropropene	6.9	U
79-00-5	1,1,2-Trichloroethane	6.9	U
127-18-4	Tetrachloroethene	6.9	U
591-78-6	2-Hexanone	14	UJ
124-48-1	Dibromochloromethane	6.9	U
106-93-4	1,2-Dibromoethane	6.9	U
108-90-7	Chlorobenzene	6.9	U
100-41-4	Ethylbenzene	6.9	U
179601-23-1	m,p-Xylene	6.9	U
95-47-6	o-Xylene	6.9	U
100-42-5	Styrene	6.9	U
75-25-2	Bromoform	6.9	U
98-82-8	Isopropylbenzene	6.9	U
79-34-5	1,1,2,2-Tetrachloroethane	6.9	U
541-73-1	1,3-Dichlorobenzene	6.9	U
106-46-7	1,4-Dichlorobenzene	6.9	U
95-50-1	1,2-Dichlorobenzene	6.9	U
96-12-8	1,2-Dibromo-3-chloropropane	6.9	UJ
120-82-1	1,2,4-Trichlorobenzene	6.9	U
87-61-6	1,2,3-Trichlorobenzene	6.9	U

76

514

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RX6

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0093-11B

Sample wt/vol: 4.50 (g/mL) G Lab File ID: V5H4913.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. 19 Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

77

5514

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RX7

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0093-12B

Sample wt/vol: 4.90 (g/mL) G Lab File ID: V5H4914.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. 25 Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6.8	U
74-87-3	Chloromethane	6.8	U
75-01-4	Vinyl chloride	6.8	U
74-83-9	Bromomethane	6.8	U
75-00-3	Chloroethane	6.8	U
75-69-4	Trichlorofluoromethane	6.8	U
75-35-4	1,1-Dichloroethene	6.8	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	6.8	U
67-64-1	Acetone	14	U
75-15-0	Carbon disulfide	6.8	U
79-20-9	Methyl acetate	6.8	U
75-09-2	Methylene chloride	6.8	U
156-60-5	trans-1,2-Dichloroethene	6.8	U
1634-04-4	Methyl tert-butyl ether	6.8	U
75-34-3	1,1-Dichloroethane	6.8	U
156-59-2	cis-1,2-Dichloroethene	6.8	U
78-93-3	2-Butanone	14	U
74-97-5	Bromochloromethane	6.8	U
67-66-3	Chloroform	6.8	U
71-55-6	1,1,1-Trichloroethane	6.8	U
110-82-7	Cyclohexane	6.8	U
56-23-5	Carbon tetrachloride	6.8	U
71-43-2	Benzene	6.8	U
107-06-2	1,2-Dichloroethane	6.8	U
123-91-1	1,4-Dioxane	140	~~U~~ R

71

SOM01.1 (5/2005)

5514

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RX7

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0093-12B

Sample wt/vol: 4.90 (g/mL) G   Lab File ID: V5H4914.D

Level: (TRACE/LOW/MED) LOW   Date Received: 01/25/2007

% Moisture: not dec. 25   Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	6.8	U
108-87-2	Methylcyclohexane	6.8	U
78-87-5	1,2-Dichloropropane	6.8	U
75-27-4	Bromodichloromethane	6.8	U
10061-01-5	cis-1,3-Dichloropropene	6.8	U
108-10-1	4-Methyl-2-pentanone	14	U J
108-88-3	Toluene	6.8	U
10061-02-6	trans-1,3-Dichloropropene	6.8	U
79-00-5	1,1,2-Trichloroethane	6.8	U
127-18-4	Tetrachloroethene	6.8	U
591-78-6	2-Hexanone	14	U J
124-48-1	Dibromochloromethane	6.8	U
106-93-4	1,2-Dibromoethane	6.8	U
108-90-7	Chlorobenzene	6.8	U
100-41-4	Ethylbenzene	6.8	U
179601-23-1	m,p-Xylene	6.8	U
95-47-6	o-Xylene	6.8	U
100-42-5	Styrene	6.8	U
75-25-2	Bromoform	6.8	U
98-82-8	Isopropylbenzene	6.8	U
79-34-5	1,1,2,2-Tetrachloroethane	6.8	U
541-73-1	1,3-Dichlorobenzene	6.8	U
106-46-7	1,4-Dichlorobenzene	6.8	U
95-50-1	1,2-Dichlorobenzene	6.8	U
96-12-8	1,2-Dibromo-3-chloropropane	6.8	U J
120-82-1	1,2,4-Trichlorobenzene	6.8	U
87-61-6	1,2,3-Trichlorobenzene	6.8	U

79

5514

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RX7

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RW0

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0093-12B

Sample wt/vol: 4.90 (g/mL) G Lab File ID: V5H4914.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. 25 Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

80

CLP DATA ASSESSMENT

7. INTERNAL STANDARDS PERFORMANCE GC/MS:

Internal standards (IS) performance criteria ensure that the GC/MS sensitivity and response are stable during every experimental run. The internal standard area count must not vary by more than 40% from the associated continuing calibration standard area. The retention time of the internal standard must not vary more than 20 seconds from the associated continuing calibration standard. If the area count is greater the 40% range of the associated standard, all of the positive results for compounds quantitated using that IS are qualified as estimated "J", and all non-detects are not flagged. If the area count is less than the 40% range of the associated standard, all of the positive results for compounds quantitated with that IS are qualified as estimated "J", and all non-detects are qualified as unusable "R".

No problems found for this qualification.

If an internal standard retention time varies by more than 20 seconds, the reviewer will use professional judgment to determine either partial or total rejection of the data for that sample fraction.

8. COMPOUND IDENTIFICATION:

A) Trace Volatile Fractions:

TCL compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and by comparison to the ion spectra obtained from known standards. For the results to be a positive hit, the sample peak must be within 0.06 RRT units of the standard compound and have an ion spectra which has a ratio of the primary and secondary m/e intensities within 20% of that in the standard compound. For the tentatively identified compounds (TIC) the ion spectra must match accurately. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

No problems.

9. CONTRACT PROBLEMS NON-COMPLIANCE:

1,4-Dioxane - Average response factor (RRF) is below contractual criteria in **initial calibration.**

1,4-Dioxane-d8 - Average response factor (RRF) is below contractual criteria in **initial calibration.**

1,4-Dioxane – Continuing response factor RF5.0 is below Contractual criteria in the **opening** CCV calibrations.

1,4-Dioxane – Continuing response factor RF5.0 is below Contractual criteria in the **closing** CCV calibrations.

1,4-Dioxane-d8 – Continuing response factor RF5.0 is below Contractual criteria in **opening** CCV calibrations.

1,4-Dioxane-d8 – Continuing response factor RF5.0 is below Contractual criteria in the **closing** CCV calibrations.

calibrations.

10. FIELD DOCUMENTATION:
No problems.

11. OTHER PROBLEMS:
Samples B3RS0 and B3RS1 exceeded the calibration range for cis-1,2-Dichloroethene and Trichloroethene, therefore, the laboratory performed dilution analyses on these samples. But, the results of the two dilutions were both less than CRQL. The Data Validator, using professional judgment, kept the original analysis values and applied the "J" qualifier.

12. This package contains reextractions, reanalyses or dilutions. Upon reviewing the QA results, the following Form 1(s) are identified not to be used.

B3RR6DL, B3RS0DL, B3RS1DL, B3RS7DL, B3RT6DL, B3RT9DL, B3RX5DL, B3RX8DL

	YES	NO	N/A

PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 36113 LAB: MITKEM

SITE NAME: WALLACE INTERNATIONAL SDG No(s).: B3RS7

1.0 Chain of Custody and Sampling Trip Reports

		YES	NO	N/A
1.1	Are the Traffic Reports/Chain-of-Custody Records present for all samples?	[√]		

ACTION: If no, contact RSCC, or the TOPO to obtain replacement of missing or illegible copies from the lab.

		YES	NO	N/A
1.2	Is the Sampling Trip Report present for all samples?	[√]		

ACTION: If no, contact either RSCC or ask the TOPO to obtain the necessary information from the prime contractor.

2.0 Data Completeness and Deliverables

		YES	NO	N/A
2.1	Have any missing deliverables been received and added to the data package?		[√]	

ACTION: Contact the TOPO to obtain an explanation or resubmittal of any missing deliverables from the lab. If lab cannot provide them, note the effect on the review of the data package in the Contract Problems/Non-compliance section of the Data Assessment.

		YES	NO	N/A
2.2	Was CLASS CCS checklist included with the package?	[√]		
2.3	Are there any discrepancies between the Traffic Reports/Chain-of-Custody Records, and Sampling Trip Report?		[√]	

	YES	NO	N/A

. . . .

ACTION: If yes, contact the TOPO to obtain an explanation or resubmittal of any missing deliverables from the laboratory.

3.0 Cover Letter SDG Narrative

		YES	NO	N/A
3.1	Is the SDG Narrative or Cover Letter Present?	[√]	___	___
3.2	Are case number, SDG number and contract number contained in the SDG Narrative or cover letter (see SOW, Exhibit B, section 2.5.1)? EPA sample numbers in the SDG, detailed documentation of any quality control, sample, shipment, and/or analytical problems encountered in processing the samples? Corrective action taken?	[√]	___	___
3.3	Does the Narrative contain the following information SOM01.1, page B-12, section 2.5.1)? Description of trap, column used, storage of samples, case#, SDG#, analytical problems, and discrepancies between field and lab weights.	[√]	___	___
3.4	Does the narrative, VOA section, contain a list of all TICs identified as alkanes and their estimated concentrations?	[√]	___	___
3.5	Did the contractor record the temperature of the cooler on the Form DC-1, Item 9 - Cooler Temperature, and in the SDG Narrative?	[√]	___	___
3.6	Does the narrative contain a list of the pH values determined for each water sample submitted for volatiles analysis (SOW, page B-13, section 2.5.1.2)?	[√]	___	___
3.7	Does the Case Narrative contain the "verbatim" statement (page B-12, section 2.5.1 of the SOM)?	[√]	___	___

ACTION: If "No", to any question in this section, contact the TOPO to obtain necessary

	YES	NO	N/A

resubmittals. If unavailable, document under the Contract Problems/ Non-Compliance section of the Data Assessment.

4.0 Data Validation Checklist

4.1 Check the package for the following (see SOM reporting requirements, section 2.1, page B-10):

	YES	NO	N/A
a. Is the package paginated in ascending order starting from the SDG narrative?	[✓]	___	___
b. Are all forms and copies legible?	[✓]	___	___
c. Assembled in the order set forth in the SOW?	[✓]	___	___
Low/Med Concentration Volatiles Data present?	[✓]	___	

Action: Take action as specified in section 3.7 above.

PART A: Low/Medium Volatile ANALYSES

1.0 Sample Conditions/Problems

	YES	NO	N/A
1.1 Do the Traffic Reports/Chain-of-Custody Records, Sampling Trip Report or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data?	___	[✓]	___

ACTION: If samples were not iced or the ice was melted upon arrival at the laboratory and the temperature of the cooler was > 10° C, then flag all positive results with a "J" and all non-detects "UJ".

ACTION: If both VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

YES NO N/A

2.0 Holding Times

2.1 Have any VOA technical holding times, determined from date of collection to date of analysis, been exceeded? ___ [√] ___

2.2 Preservation: Aqueous samples must be preserved with HCL to pH of 2 or below and cooled at 4°C ± 2°C. Non-aqueous samples: frozen (less than -7°C) or properly cooled (4°C ± 2°C) and preserved with $NaHSO_4$.

Action: Qualify sample results according to the following table.

Holding Time Actions for Low/Medium Volatile Analyses

Matrix	Preserved	Criteria	ACTION	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤ 7 Days	NO Action	
	No	> 7 Days	J	R
	Yes	≤ 14 Days	No Action	
	Yes	> 14 Days	J	R
Non-Aqueous	No	≤ 14 Days	J	R
	Yes	≤ 14 Days	No Action	
	Yes/No	> 14 Days	J	R

YES NO N/A

. . . .

3.0 Deuterated Monitoring Compound (DMC) Recovery (Form II)

3.1 Are the Volatile SMC Recovery Summaries (Form II present? [√] ___ ___

ACTION: Contact the TOPO to obtain an explanation/resubmittal from the lab. If missing deliverables are unavailable, document the effect in the Data Assessment.

3.2 Were outliers marked correctly with an asterisk? [√] ___ ___

ACTION: Circle all outliers in red.

3.3 Were more than three of the fourteen (14) Deuterated Monitoring Compounds (DMC's) recoveries outside their corresponding limits? ___ [√] ___

If yes, were samples re-analyzed? [ ] ___ √

Were method blanks re-analyzed? [ ] ___ √

ACTION: If any DMC is outside the required limits (see Table below), qualify their associated target compounds (See Table below) as follows:

VOLATILE DMC AND THEIR ASSOCIATED TARGET COMPOUNDS

Chloroethane-d5	1,2-Dichloropropane-d6	1,2-Dichlorobenzene-d4
Dichlorodifluoromethane	Cyclohexane	Chlorobenzene
Chloromethane	Methylcyclohexane	1,3-Dichlorobenzene
Bromomethane	1,2-Dichloropropane	1,4-Dichlorobenzene
Chloroethane	Bromodichloromethane	1,2-Dichlorobenzene
Carbon Disulfide		1,2,4-Trichlorobenzene
		1,2,3-Trichlorobenzene

YES NO N/A

<u>1,4-Dioxane-d8</u> 1,4-Dioxane	<u>trans-1,3-Dichloropropene-d4</u> cis-1,3-Dichloropropene trans-1,3-Dichloropropene 1,1,2-Trichloroethane	<u>Chloroform-d</u> 1,1-Dichloroethane Bromochloromethane Chloroform Dibromochloromethane Bromoform
<u>2-Butanone-d5</u> Acetone 2-butanone	<u>1,1-dichloroethene-d2</u> trans-1,2-Dichloroethene cis-1,2-Dichloroethene	<u>2-Hexanone-d5</u> 4-Methyl-2-pentanone 2-Hexanone
<u>Vinyl Chloride-d3</u> Vinyl Chloride	<u>Benzene-d6</u> Benzene	<u>1,1,2,2-Tetrachloroethane-d2</u> 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane
<u>1,2-Dichloroethane-d4</u> Trichlorofluoromethane 1,1-Dichloroethene 1,1,2-Trichloro-1,2,2-trifluoroethane Methyl Acetate Methylene Chloride Methyl tert-Butyl Ether Carbon Tetrachloride 1,2-Dichloroethane 1,1,1-Trichloroethane 1,2-Dibromoethane	<u>Toluene-d8</u> Trichloroethene Toluene Tetrachloroethene Ethylbenzene o-Xylenes m,p-Xylene Styrene Isopropylbenzene	

88

YES NO N/A

VOLATILE DEUTERATED MONITORING COMPOUND RECOVERY LIMITS

DMC	Recovery Limits (%) for Water Samples	Recovery Limits (%) for Soil samples
Vinyl Chloride-d3	65 - 131	68 - 122
Chloroethane-d5	71 - 131	61 - 130
1,1-Dichloroethene-d2	55 - 104	45 - 132
2-Butanone-d5	49 - 155	20 - 182
Chloroform-d	78 - 121	72 - 123
1,2-Dichloroethane-d4	78 - 129	79 - 122
Benzene-d6	77 - 124	80 - 121
1,2-Dichloropropane-d6	79 - 124	74 - 124
Toluene-d8	77 - 121	78 - 121
trans-1,3-Dichloropropene-d4	73 - 121	72 - 130
2-Hexanone-d5	28 - 135	17 - 184
1,4-Dioxane-d8	50 - 150	50 - 150
1,1,2,2-Tetrachloroethane-d2	73 - 125	56 - 161
1,2-Dichlorobenzene-d4	80 - 131	70 - 131

1. For any recovery greater than the upper limit:

   a. Qualify "J" all positive associated target compounds.
   b. Do not qualify associated non-detects.

2. For any recovery greater than or equal to 20%, but less than the lower limit:

   a. Qualify "J" all positive associated target compounds.

YES NO N/A

. . . .

b. Qualify "UJ" associated non-detects.

3. For any recovery less than 20%:

a. Qualify "J" all positive associated target compounds.
b. Qualify "R" all associated non-detects.

NOTE: Up to three (3) DMC's per sample, excluding 1,4-Dioxane-d8, may fail to meet the recovery limits. (SOM, sec. 11.3.4, pg. D-45/Low Medium VOA). Recovery limits for 1,4-Dioxane-d8 are advisory.
As per SOM, any sample which has more than 3 DMC's outside the limits, it must be reanalyzed (SOM sec. 11.4.3.1 pg. D-46/Low Medium VOA).

ACTION: Note in the Data Assessment under Contract Problems/ Non-Compliance if the Lab did not perform reanalysis.

3.4 Are there any transcription/calculation errors between raw data and form II? ___ [√] ___

ACTION: If large errors exist, ask the TOPO to obtain an explanation/resubmittal from the lab, make any necessary corrections and note errors in the data assessment.

4.0 <u>Matrix Spike/Matrix Spike Duplicate Recovery (Form III)</u>
Note: Data for MS/MSD will not be present unless requested.

4.1 Are the MS/MSD Recovery Forms (Form III Low/Med VOA) present? [ ] √ ___

4.2 Was the MS/MSD analyzed at the required frequency (once per SDG, or every 20 samples, whichever is more frequent)? [ ] ___ √

ACTION: If any MS/MSD data are missing, take action as specified in section 3.1 above.

ACTION: No action is taken on MS/MSD data <u>alone.</u> However, using professional judgement, the validator may use the MS and MSD results in conjunction with other

	YES	NO	N/A

QC criteria and determine the need for some qualification of the data.

5.0 Method Blanks (Form IV)

	YES	NO	N/A
5.1 Is the Volatile Method Blank Summary (Form IV VOA) present for aqueous and soil samples?	[√]	___	___
5.2 Frequency of Analysis: For the analysis of Low/ Med Concentration VOA TCL compounds, has a method blank been analyzed for each SDG or every 20 samples, whichever is more frequent?	[√]	___	___
5.3 Has a VOA method blank been analyzed after the calibration standards and once every 12 hours time period for each GC/MS instrument used?	[√]	___	___
5.4 Was a VOA instrument blank analyzed after each sample/dilution that contains a target compound exceeding the initial calibration range (see SOM, page D-48/Low/Medium VOA, section 12.1.1.3)?	[√]	___	___

ACTION: If any method/instrument blank data are missing, notify the TOPO to obtain resubmittals or an explanation from the lab. If method blank data are unavailable, the reviewer may use professional judgement, or substitute field blank or trip blank data for missing method blank data.

If an instrument blank was not analyzed after a sample containing a target analyte exceeding the initial calibration standards, inspect the sample chromatogram acquired immediately after this sample for possible carryover. The system is considered uncontaminated if the target analyte is below CRQL. Use professional judgement to determine if carryover occurred and qualify analyte(s) accordingly.

	YES	NO	N/A
5.5 Was a storage blank analyzed once per SDG after all the samples were analyzed?	[√]	___	___

YES NO N/A

ACTION: If storage blank data is missing, contact the TOPO to obtain any missing deliverables from the laboratory. If unavailable, note in the Contract Problems/Non-Compliance section of the Data Assessment.

5.6 The validator should verify that the correct identification scheme for EPA blanks was used. (See SOM page B-39, section 3.3.7.3 for more information.)

Was the correct identification scheme used for all Low/Med VOA blanks? [✓] ___ ___

ACTION: Contact the TOPO to obtain corrections from the lab, or make the necessary corrections. Document in the "Contract Problems/Non-Compliance section of the Data Assessment all corrections made by the validator.

5.7 Chromatography: review the blank raw data - chromatograms (RICs), quant. reports, data system printouts and spectra.

Also compare the storage blank raw data with the method blank. Determine if contamination in the storage blank is also present in the method blank.

Is the chromatographic performance (baseline stability) for each instrument acceptable for Low/Med VOAs? [✓] ___ ___

ACTION: Use professional judgement to determine the effect on the data.

5.8 Are all detected hits for target compounds in method, and storage blanks less than the CRQL? [✓] ___ ___

Exception: Methylene Chloride, Acetone and 2-butanone must be less than 2X times their respective CRQLs.

ACTION: If no, an explanation and laboratory's corrective actions must be addressed in the case narrative. If the narrative contains no explanation, then make a note in the Contract Problems/Non-Compliance section of the Data Assessment.

YES NO N/A

6.0 Contamination

NOTE: "Water blanks", "drill blanks", and distilled water blanks" are validated like any other sample, and are not used to qualify data. Do not confuse them with the other QC blanks discussed below.

6.1 Does the storage blank contain positive results (TCL and/or TICs) for Low/Med Concentration VOAs? ___ [✓] ___

6.2 Do any method/reagent/instrument blanks contain positive results (including TICs) for Low/Med Concentration VOAs? ✓ [ ] ___

NOTE: Contaminated instrument blanks are unacceptable under this SOW (see page D-50/VOA, section 12.1.5.2).

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance if a contaminated instrument blank was submitted.

ACTION: Sample analysis results after the high concentration sample must be evaluated for carryover. Sample must meet the maximum carryover criteria as listed in SOM sec. 11.3.8 p. D-46/VOA.("the sample must not contain a concentration above the CRQL for the target compounds that exceeded the limit in the contaminated sample.")

6.3 Do any field/trip/rinse blanks have positive hits for Low/Med VOA results (including TICs)? ✓ [ ] ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated with a particular group of samples (may exceed one per case) must be used to qualify data. Trip blanks are used to qualify only those samples with which they were shipped. Blanks may not be qualified because of contamination in another blank.

YES NO N/A

Field blanks & trip blanks must be qualified for system monitoring compound, instrument performance criteria, spectral or calibration QC problems.

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks. If any blanks are grossly contaminated, all associated sample data should be qualified unusable (R).

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field, Trip, Storage, Instrument **	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report blank concentration for sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required
	Gross contamination	Detects	Qualify results as unusable R
	TIC > 2ug/L	Detects	See "Action" below

* 2x the CRQL for methylene chloride, 2-butanone and acetone

** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

YES NO N/A

NOTE: Analytes qualified "U" for blank contamination are treated as "hits" when qualifying for calibration criteria.

Note: When applied as described in the table above, the contaminant concentration in the blank are multiplied by the sample dilution factor.

ACTION ; For TIC compounds, if the concentration in the sample is less than five times the concentration in the most contaminated associated blank, flag the sample data "R" (unusable).

6.4 Are there field/rinse/equipment blanks associated with every sample? [ ] ✓ ___

ACTION: Note in data assessment that there is no associated field/rinse/equipment blank.

<u>Exception</u>: samples taken from a drinking water tap do not have associated field blanks.

7.0 GC/MS Instrument Performance Check (Form V)

7.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for Bromofluorobenzene (BFB)? [✓] ___ ___

7.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? [✓] ___ ___

7.3 Did the 12-hour clock begin with either the injection of BFB, or in cases where a closing continuing calibration (CCV) was used as an opening CCV? [✓] ___ ___

Listed below are some, but not necessarily all, examples of acceptable analytical sequences incorporating the use of the opening/closing CCV. Use these examples as a guide for possible analytical sequences that can be expected.

Conditions for When Example Sequence is Appropriate:	Acceptable Criteria That Must be Met:	Notes:
If time remains on the 12 hour clock after initial calibration sequence	• BFB tunes meet instrument performance criteria. • The five initial calibration standards meet initial calibration criteria. • CCV A meets both opening and closing CCV criteria • CCV B meets closing CCV criteria.	The requirement of starting the new 12-hr clock for Analytical Sequence 2 with a new BFB tune is waived if CCV A meets opening CCV criteria. If CCV B meets opening CCV criteria, a method blank and subsequent samples may be analyzed immediately after CCV B.
If time remains on the 12 hour clock after initial calibration sequence	• BFB tunes meet instrument performance criteria. • The five initial calibration standards meet initial calibration criteria. • CCV A meets closing CCV criteria.(but does not meet opening CCV criteria). • CCV B meets opening CCV criteria. • CCV C meets closing CCV Criteria.	CCV A does not meet opening criteria, therefore a new BFB tune must be performed, immediately followed by CCV B before a method blank and any samples may be analyzed. In this case, the new 12 hr clock and Analytical Sequence 2 begins with the injection of the new BFB tune.
If more than 12 hrs have elapsed since the most recent initial calibration or closing CCV. OR If the most recent closing CCV was not or could not be used as an opening CCV.	• BFB tunes meet instrument performance criteria. • CCV A meets opening CCV criteria. • CCV B meets both opening and closing CCV criteria. • CCV C meets both opening and closing CCV criteria.	The requirement of starting the new 12 hour clock for Analytical Sequence 2 with a new BFB tune is waived if CCV B meets opening CCV criteria. If CCV C meets opening CCV criteria, a method blank and subsequent samples may be analyzed immediately after CCV B.

YES NO N/A

If more than 12 hrs have elapsed since the most recent initial calibration or closing CCV OR If the most recent closing CCV was not or could not be used as an opening CCV	• BFB tunes meet instrument performance criteria. • CCV A meets opening CCV criteria. • CCV B meets closing CCV criteria (but does not meet opening CCV criteria). • CCV C meets opening CCV Criteria. • CCV D meets both opening and closing CCV criteria.	CCV B does not meet opening CCV criteria, therefore a new BFB tune must be performed, immediately followed by CCV B before a method blank and any samples may be analyzed. In this case, the new 12 hr clock and Analytical Sequence 2 begins with the injection of the new BFB tune. The requirement of starting the new 12 hr clock for Analytical Sequence 3 with a new BFB tune is waived if CCV D meets opening CCV criteria. If CCV D meets opening criteria, a method blank and subsequent samples may be analyzed after CCV B.

7.4 Have the ion abundances been normalized to m/z 95 [√] ___ ___

NOTE: All ion abundance ratios must be normalized to m/z 95, the nominal base peak, even though the ion abundance of m/z 174 may be up to 120% that of m/z 95.

ACTION: If mass assignment is in error, qualify all associated data as unusable (R).

7.5 Have the ion abundance criteria been met for each instrument used? [√] ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, professional Judgement may be applied to determine to what extent the data may be utilized.

7.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.) ___ [√] ___

7.7 Is the number of significant figures for the reported relative abundances consistent with the number given in the ion abundance criteria column on Form V ? [√] ___ ___

	YES	NO	N/A

. . . .

ACTION: If large errors exist, take action as specified in section 3.1 above.

		YES	NO	N/A
7.8	Is the spectrum of the mass calibration compound acceptable?	[√]	___	___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

8.0 Target Compound List (TCL) Analytes (Form I)

8.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:

	YES	NO	N/A
a. Samples and/or fractions as appropriate?	[√]	___	___
b. Regional Control/MS/MSD samples?	[√]	___	___
c. Blanks (method, trip, etc)?	[√]	___	___

8.2 Are the VOA Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following:

	YES	NO	N/A
a. Samples and/or fractions as appropriate?	[√]	___	___
b. Regional Control/MS/MSD samples?	[√]	___	___
c. Blanks (method, trip, etc)?	[√]	___	___

ACTION: If any data are missing, take action specified in 3.1 above.

8.3 Is chromatographic performance acceptable with respect to:

	YES	NO	N/A
Baseline stability?	[√]	___	___
Resolution?	[√]	___	___
Peak shape?	[√]	___	___
Full-scale graph (attenuation)?	[√]	___	___
Other: ________________________?	[ ]	___	√

ACTION: Use professional judgement to determine the acceptability of the data.

		YES	NO	N/A
8.4	Are lab-generated standard mass spectra of the identified VOA compounds present for each sample?	[√]	___	___

YES NO N/A

ACTION: If any mass spectra are missing, take action as specified in 3.1 above. If lab does not generate their own standard spectra, make note under the "Contract Problems/Non-Compliance" section of the Data Assessment. If spectra are unavailable reject "R" the reported results.

8.5 Is the RRT of each reported compound within ± 0.06 RRT units of the standard RRT in the continuing calibration? [√] ___ ___

8.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum? [√] ___ ___

8.7 Do sample and standard relative ion intensities agree to within ± 20%? [√] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R) flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in sections 8.4-8.7 above.

ACTION: When sample carry-over is suspected, review section 6.2/Action #2 above before determining if instrument cross-contamination has affected positive compound identifications.

9.0 Tentatively Identified Compounds (TIC)

9.1 Are all Tentatively Identified Compound Forms (Form I VOA-TIC) present? Do listed TICs include scan number or retention time, as well as the estimated "J" and/or "JN" qualifier? [√] ___ ___

9.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate? [ ] ___ √

b. Blanks? [ ] ___ √

b. Are Alkanes listed in/or part of the Case Narrative? [ ] ___ √

ACTION: If any TIC data are missing, take action specified in 3.1 above.

	YES	NO	N/A
ACTION: Verify "JN" qualifier is present for all chemically named TICs having a percent match of greater than or equal 85%. TICs labeled "unknown" are qualified with a "J" qualifier.			
9.3 Are any target compounds (from any fraction) listed as TICs? (Example: 1,2-dimethylbenzene is xylene - a VOA target analyte - and should not be reported as a TIC.)	___	[ ]	✓
ACTION: Flag with "R" only target compound detected in another fraction (except blank contamination).			
9.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% also present in the sample mass spectrum?	[ ]	___	✓
9.5 Do TICs and "best match" reference spectra relative ion intensities agree within $\pm$ 20%?	[ ]	___	✓

ACTION: Use professional judgement to determine the acceptability of TIC identifications. If it is determined that an incorrect identification was made, change its identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate.

Action: When a compound is not found in any blank, but is detected in a sample and is a suspected artifact of a common laboratory contaminant, solvent preservatives or Aldo condensation, the result should be qualified as unusable (R). (i.e., common lab contaminants such as CO_2(m/e 44), Siloxanes (m/e 73), diethyl ether, hexane, certain freons. Aldol condensation products: 4-hydroxy-4-methyl-2-pentanone, 4-methyl-2-penten-2-one, and 5,5-dimethyl-2(H)-furanone. Solvent preservatives cyclohexene, and related by-products: cyclohexanone, cyclohexenone, cyclohexanol, cyclohexenone, chlorocyclohexene, and chlorocyclohexanol.).

10.0 Compound Quantitation and Reported Detection Limits

	YES	NO	N/A
10.1 Are there any transcription/calculation errors in Form I results? (Check at least two positive values. Verify that the correct internal standards, quantitation ions, and RRFs were used to calculate Form I results.)	___	[✓]	___
10.2 Are the CRQLs adjusted to reflect sample dilutions and per cent moisture?	[✓]	___	___

ACTION: If errors are large, take action as specified in section 3.1 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the

YES NO N/A

higher CRQLs data from the diluted sample). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and its corresponding value on the original Form I and substituting the data from the diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's not to be used, including any in the data summary package.

10.3 For non-aqueous samples, were the percent moisture < 70%? [ ] ___ ✓

Action: If the % moisture ≥ 70.0% and < 90.0%, qualify detects as "J" and non-detects as approximated "UJ" If the % Moisture ≥ 90%, qualify detects as "J" and non-detects as "R"

11.0 Standards Data (GC/MS)

11.1 Are the reconstructed ion chromatograms, and data system printouts (quant. reports) present for each initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.1 above.

12.0 GC/MS Initial Calibration (Form VI)

12.1 Are the Initial Calibration Forms (Form VI LCV) present and complete for the volatile fraction at concentrations of 5, 10, 50, 100, and 200 µg/ℓ for non-ketones, 10, 20, 100, 200 and 400 ug/L for ketones and 100, 200, 1250, 2000, and 4000 ug/L for 1,4-dioxane. [✓] ___ ___

ACTION: If any Initial Calibration forms are missing, take action as specified in section 3.1 above.

12.2 Are the relative standard deviation (RSD) stable for VOA's over the concentration range of the calibration (i.e., %RSD ≤ 20.%, ≤ 40% for poor performers (see table below), ≤ 50% for 1,4-dioxane)? [✓] ___ ___

ACTION: Circle all outliers in red.

NOTE: The twenty two (22) poor performers compounds and associated DMCs are listed below. The relative response factor (RRF) for these compounds must be greater than or equal to 0.010.

101

YES NO N/A

Volatile Compounds Exhibiting Poor Response

Volatile Compounds	
Acetone	1,2-Dibromo-3-chloropropane
2-Butanone	Isopropylbenzene
Carbon disulfide	Methyl acetate
Chloroethane	Methylene chloride
Chloromethane	Methylcyclohexane
Cyclohexane	Methyl tert-butyl ether
1,4-Dioxane	trans-1,2-Dichloroethene
1,2-Dibromoethane	4-Methyl-2-pentanone
Dichlorodifluoromethane	2-Hexanone
cis-1,2-dichloroethene	Trichlorofluoromethane
1,2-Dichloropropane	1,1,2-Trichloro-1,2,2-trifluoroethane

ACTION: If %RSD > 20.0%, (> 40.0% for the poor performers, and > 50% for 1,4-dioxane), qualify associated positive results for that analyte "J" (estimated). If %RSD is > 90, flag all non-detects for that analyte "R" (unusable) and positive results "J".

NOTE: Analytes previously qualified "U" for blank contamination are still treated as "hits" when qualifying for initial calibration criteria.

12.3 Are any $\overline{RRF}$s < 0.050 (< 0.010 for poor performers)? ✓ [ ] ___

ACTION: Circle all outliers in red.

ACTION: If any $\overline{RRF}$ values are < 0.05 or < 0.01 for poor performers, qualify associated non-detects unusable (R) and associated positive results estimated (J).

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance the analytes that fail %RSD and/or RRF criteria.

12.4 Are there any transcription/calculation errors in

YES NO N/A

the reporting of RRFs, RRFs or %RSD values? (Check at least 2 values, but if errors are found, check more.) ___ [✓] ___

ACTION: Circle errors in red.

ACTION: If errors are large, contact the TOPO to obtain an explanation/resubmittal from the lab, document in the Data Assessment under Contract Problems/Non-Compliance.

13.0 GC/MS Continuing Calibration Verification (CCV) (Form VII)

13.1 Are the Continuing Calibration Forms (Form VII) present and complete for the volatile fraction? [✓] ___ ___

13.2 Did the 12 hour clock begin with either the injection of BFB or in cases where a closing CCV can be used as an opening CCV for each instrument? [✓] ___ ___

ACTION: If any forms are missing or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, ask the TOPO to obtain explanation/resubmittal from the laboratory. If continuing calibration data are unavailable, flag all associated sample data as unusable (R).

13.3 Do any volatile compounds have a % Difference (% D) between the initial RRF and CCV RRF exceeding ± 50% for 1,4-Dioxane, ± 40% for the poor performers or ± 25% for the remaining compounds? ✓ [ ] ___

ACTION: Circle all outliers in red.

13.4 Do any volatile compounds have a RRF < 0.05 or < 0.01 for the poor performers? ___ [ ] ___

ACTION: Circle all outliers in red.

Note: Verify that the CCV was run at the required frequency (an opening and closing CCV must be run within 12-hour period) and the CCV was compared to the correct initial calibration. If the mid-point standard from the initial calibration is used as an opening CCV, verify that the result (RRF) of the mid-point standard was compared to the average RRF from the correct initial calibration.

Note: The closing CCV used to bracket the end of a 12-hour analytical sequence may be used as the opening CCV for the new 12-hour analyical sequence, provided that all the technical acceptance criteria are met for an opening CCV (see table below). If the closing CCV does not meet the technical acceptance criteria for an opening CCV, then a BFB tune followed by an opening CCV is required and the next 12-hour time period begins with the BFB tune.

Action: Use the following table to qualify data based on the technical acceptance criteria for the opening CCV and closing CCV.

YES NO N/A

. . . .

Continuing Calibration Verification (CCV) Actions for Low/Medium Volatiles Analyses

Criteria for Opening CCV	Criteria for Closing CCV	Action	
		Detected Associated Compounds	Non-Detected Associated Compounds
RRF < 0.010 (poor responders) RRF < 0.050 (all other volatile target compounds)	RRF < 0.010 (for all volatile target compounds)	J	R
RRF ≥ 0.010 (poor responders) RRF ≥ 0.050 (for all other compounds)	RRF ≥ 0.010 (for all target volatile compounds)	No Action	
%D > 50.0 or < -50.0 (1,4-Dioxane) %D > 40.0 or < -40.0 (poor responders) %D > 25.0 or < -25.0 (all other volatile target compounds)	%D > 50.0 or < -50.0 (for all volatile target compounds)	J	UJ
%D ≤ 50.0 or ≥ -50.0 (1,4-Dioxane) %D ≤ 40.0 or ≥ -40.0 (poor responders) %D ≤ 25.0 or ≥ -25.0 (all other volatile target compounds)	%D ≤ 50.0 or ≥ -50.0 (for all volatile target compounds)	No Action	
Opening CCV not performed at required frequency *	Closing CCV not performed at required frequency *	R	

* See section 13.2 above

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance if more than two of the required analytes failed the above acceptance criteria.

13.5 Are there any transcription/calculation errors for the reporting of RRFs, or %D between initial RRFs and continuing RRFs? (Check at least two values but if errors are found, check more.) ___ [✓] ___

ACTION: Circle errors with red pencil.

ACTION: If errors are large, notify the TOPO to obtain explanation/resubmittals from the lab. Document errors in the Contract Problems/Non-Compliance section of the Data Assessment.

YES NO N/A

Note: All DMCs must meet RRF ≥ 0.010. No qualification of the data is necessary on the DMCs RRF and %RSD/%Diff data alone. However, use professional judgment to evaluate the DMC and %RSD/% Diff data in conjunction with the DMC recoveries to determine the need of qualification of the data.

14.0 Internal Standard (Form VIII)

14.1 Were the internal standard area counts for every sample and blank within the range of 50.0% and 200.0% of its response in the most recent opening CCV standard calibration? [✓] __ __

If no, were affected sample reanalyzed? [ ] __ ✓

ACTION: 1. Circle all outliers with red pencil.

14.2 Are the retention times of the internal standards in sample or blanks within ±30 seconds from the RT of the internal standard in the 12-hour associated calibration standard (opening CCV or mid-point standard from initial calibration)? [✓] __ __

Action: Use the following table to qualify the data:

INTERNAL STANDARDS ACTIONS FOR LOW/MEDIUM VOLATILES

Criteria	ACTION	
	Detected Associated Compounds *	Non-detected Associated Compounds *
Area counts ≥ 50% and ≤ 200% of 12-hour standard (opening CCV or mid-point standard from initial calibration)	No Action	
Area counts < 50% of 12-hour standard (opening CCV or mid-point standard from initial calibration)	J	R
Area counts > 200% of 12-hour standard (Opening CCV or mid-point standard from initial calibration)	J	No Action
RT difference > 30.0 seconds between samples and 12-hour standard (Opening CCV or mid-point standard from initial calibration)	R**	R
RT difference ≤ 30.0 seconds between samples and 12-hour standard (Opening CCV or mid-point standard from initial calibration)	No Action	

* For volatile compounds associated to each internal standard, see Table 3-Low/Medium Volatile Target Compounds and Deuterated Monitoring Compounds with Corresponding Internal Standards for Quantitation in SOM01.1, Exhibit D, available at:

Http://www.epa.gov/superfund/programs/clp/soml.htm

** Examine the chromatographic profile for that sample to determine if any false positives or negatives exist. For shifts of a large magnitude, the reviewer may consider partial or total rejection of the data for that sample fraction. Detects should not need to be qualified as unusable "R" if the mass spectral are met.

NOTE: Contract Requirements: The SOM (section 11.4.1 page D-46/VOA Low/Medium states that any sample which fails the acceptance criteria for IS response must be reanalyzed.

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance any sample(s) which failed the above IS acceptance criteria.

15.0 Field Duplicates

15.1 Were any field duplicates submitted for Low Concentration VOA analysis? [✓] ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between duplicate results must be addressed in the reviewer narrative. If large differences exist, contact the TOPO to confirm identification of field duplicates with the sampler.

RECEIVED
FEB 0 1 2007
HAZ. WASTE SUPPORT SEC.

SDG Narrative

Mitkem Corporation submits the enclosed data package in response to USEPA Case # 36113 and SDG# B4RS7. Analyses were performed for eighteen aqueous samples that were received on January 23 to 25, 2007. The analyses were performed under USEPA Contract # EP-W-05-030. Please note that the sample-shipping cooler received on January 23 and 25 was measured at 3°C. The cooler received on January 24 was measured at 1°C.

All the vials for the following samples contained sediment: B3RS7, B3RT6, B3RT9, B3RR6, B3RS0, B3RS1, B3RS4, B3RT0, B3RT3, B3RW2, B3RX5 and B3RX8. The sediment may interfere with DMC recoveries. Per the Region, proceed with analysis of the samples.

No sample tags were received with the samples. Per the Region, proceed with analysis of the samples.

The following samples are submitted in this data package:

Client ID	Lab ID	Analysis	VOA pH
B3RS7	F0076-01A	V	<2
B3RS7DL	F0076-01ADL	V	<2
B3RT6	F0076-02A	V	<2
B3RT6DL	F0076-02ADL	V	<2
B3RT9	F0076-03A	V	<2
B3RT9DL	F0076-03ADL	V	<2
B3RY3	F0076-04A	V	<2
B3RY6	F0076-05A	V	<2
B3RR6	F0076-06A	V	<2
B3RR6DL	F0076-06ADL	V	<2
B3RS0	F0076-07A	V	<2
B3RS0DL	F0076-07ADL	V	<2
B3RS1	F0076-08A	V	<2
B3RS1DL	F0076-08ADL	V	<2
B3RS4	F0076-09A	V	<2
B3RT0	F0076-10A	V	<2
B3RT3	F0076-11A	V	<2
B3RY4	F0076-12A	V	<2
B3RY7	F0076-13A	V	<2
B3RW2	F0076-14A	V	<2
B3RX5	F0076-15A	V	<2
B3RX5DL	F0076-15ADL	V	<2
B3RX8	F0076-16A	V	<2
B3RX8DL	F0076-16ADL	V	<2

107

Client ID	Lab ID	Analysis	VOA pH
B3RY5	F0076-17A	V	<2
B3RY8	F0076-18A	V	<2

V = Volatiles
S = Semivolatiles

The analyses were performed using USEPA CLP Multi-Media, Multi-Concentration (SOM01.1) protocols. The analyses were performed with strict adherence to the SOW with the following exceptions and observations:

1. Overall Observation:

Where needed, manual integrations were performed to improve data quality. The corrections were reviewed and associated hardcopies generated and reported as required. Manual integrations are coded to provide the data reviewer justification for such action. The codes are labeled on the ion chromatogram signal (GC/MS signal) and chromatogram for GC based analysis as follows:

- M1 peak tailing or fronting.
- M2 peak co-elution.
- M3 rising or falling baseline.
- M4 retention time shift.
- M5 miscellaneous – under this category, the justification is explained.

2. Volatile Analysis:

Trap used for instrument V2: OI Analytical #10 trap containing 8 cm each of Tenax, silica gel and carbon molecular sieve.

GC column used: 30 m x 0.25 mm id (1.4 um film thickness) DB-624 capillary column.

cis-1,3-Dichloropropene-d4 was detected in method blanks and in samples. The volatile organic deuterated monitoring compound spike solution contains both the cis- and trans-1,3-dichloropropene isomers. cis-1,3-Dichloropropene-d4 is not a dueterated monitoring compound for SOM01.1, while the trans isomer is. The cis isomer is considered a laboratory artifact, and is not reported as a tentatively identified compound.

108

The following equation was used to calculate the concentration of target analytes for aqueous samples:

$$\text{Concentration } (\mu g/L) = \frac{(\text{Amt})(\text{DF})(\text{UF})(5)}{V_o}$$

where: Amt = CAL – AMT on raw data
DF = Dilution factor
UF = ng unit correction factor
V_o = Sample volume purged (mL)

DMC recoveries were within the QC limits with the exception of high recovery of 1,1-dichloroethene-d2 in sample B3RT6 and high recovery of chloroethane-d5 in samples B3RS4, B3RY4, B2RY5, B3RX5DL, B3RX8DL and B3RR6DL.

No manual integrations were performed.

To ensure that all target analyte responses were within the response of the high standard, the following samples were re-analyzed at dilution: B3RR6 (80x), B3RS0 (200x), B3RS1 (200x), B3RS7 (20x), B3RT6 (40x), B3RT9 (10x), B3RX5 (5x) and B3RX8 (7x).

For 1,4-dioxane and 1,4-dioxane-d8, the laboratory was unable to meet the minimum average RRF of 0.0050 in both the initial calibration and calibration verifications. In our experience, this compound will not reliably achieve the SOM method performance criteria due to its high water solubility. This compound is able to be reliably analyzed as an extractable semivolatile organic compound.

No other unusual observation was made for the analysis.

All of the submittals to the region are originals other than logbook pages. Photocopies of logbook pages are included, with the originals maintained on file at the laboratory. Tunes, calibration verifications and initial calibrations that are shared among several cases are photocopies indicating the location of the originals.

I certify that this Sample Data Package is in compliance with the terms and condition of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy Sample Data Package and in the electronic data deliverable has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Agnes Ng

Agnes Ng
CLP Project Manager
01/31/07

110

Contract Laboratory Program

RECEIVED
FEB 01 2007
HAZ. WASTE SUPPORT SEC.

Sample Delivery Group (SDG)
Cover Sheet

SDG Number B3RS7

Laboratory Name	Mitkem Coroporation	Lab Code	MITKEM
Contract No.	EP-W-05-030	Case No.	36113
Analysis Price	$ 0.00	SDG Turnaround	7 days

EPA Sample Numbers in SDG (Listed in Numerical Order)

01) B3RR6	08) B3RT6	15) B3RY5	
02) B3RS0	09) B3RT9	16) B3RY6	
03) B3RS1	10) B3RW2	17) B3RY7	
04) B3RS4	11) B3RX5	18) B3RY8	
05) B3RS7	12) B3RX8		
06) B3RT0	13) B3RY3		
07) B3RT3	14) B3RY4		

First Sample in SDG: B3RS7

Last Sample in SDG: B3RY8

First Sample Receipt Date: 01/23/2007

Last Sample Receipt Date: 01/25/2007

Note: There are a maximum of 20 field samples [excluding Performance Evaluation (PE) samples in an SDG. Attach the TR/COC Records to this form in alphanumeric order (the order listed above on this form).

Signature Agnes R Ng   Date 01/26/2007

111

Gw01

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3RR6

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-06A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2305.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/24/2007

% Moisture: not dec. Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	8.0	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	3.2	J
67-64-1	Acetone	10	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	14	
78-93-3	2-Butanone	10	U
74-97-5	Bromochloromethane	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	~~100~~	~~U~~ R

112

GW01

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR6

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-06A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2305.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/24/2007

% Moisture: not dec. Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-01-6	Trichloroethene	16	
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	8900* ~~1600~~	~~E~~
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
95-47-6	o-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

*TRANSFERRED FROM DILUTION.

123

GW01

EPA SAMPLE NO.

B3RR6

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-06A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2305.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/24/2007

% Moisture: not dec. Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796 [1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

114

GW02

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RS0

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-07A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2306.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/24/2007

% Moisture: not dec. Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	100	
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	27	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	3.9	J
67-64-1	Acetone	10	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	7.1	
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	650 ~~550~~	~~E~~ J
78-93-3	2-Butanone	10	U
74-97-5	Bromochloromethane	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	~~100~~	~~U~~ R

* [illegible]

115

GW02

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RS0

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-07A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2306.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/24/2007

% Moisture: not dec. Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-01-6	Trichloroethene	~~510~~	~~E~~ J
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	19,000 ~~2000~~	~~E~~ *
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
95-47-6	o-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

* TRANSFERRED FROM DILUTION.

116

6w02

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RS0

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-07A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2306.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/24/2007

% Moisture: not dec. Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

117

Gu02A

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RS1

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER   Lab Sample ID: F0076-08A

Sample wt/vol: 5.00 (g/mL) ML   Lab File ID: V2J2307.D

Level: (TRACE/LOW/MED) LOW   Date Received: 01/24/2007

% Moisture: not dec.   Date Analyzed: 01/25/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	150	
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	27	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	4.2	J
67-64-1	Acetone	10	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	11	
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	700 ~~740~~	~~E~~ J
78-93-3	2-Butanone	10	U
74-97-5	Bromochloromethane	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	~~100~~	~~U~~ R

* [illegible]

118

Gw02 A

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RS1

Lab Name: MITKEM CORPORATION | Contract: EP-W-05-030

Lab Code: MITKEM | Case No.: 36113 | Mod. Ref No.: | SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER | Lab Sample ID: F0076-08A

Sample wt/vol: 5.00 (g/mL) ML | Lab File ID: V2J2307.D

Level: (TRACE/LOW/MED) LOW | Date Received: 01/24/2007

% Moisture: not dec. | Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm) | Dilution Factor: 1.0

Soil Extract Volume: (uL) | Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q	
79-01-6	Trichloroethene	600 ~~610~~	~~E~~ J	*
108-87-2	Methylcyclohexane	5.0	U	
78-87-5	1,2-Dichloropropane	5.0	U	
75-27-4	Bromodichloromethane	5.0	U	
10061-01-5	cis-1,3-Dichloropropene	5.0	U	
108-10-1	4-Methyl-2-pentanone	10	U	
108-88-3	Toluene	5.0	U	
10061-02-6	trans-1,3-Dichloropropene	5.0	U	
79-00-5	1,1,2-Trichloroethane	5.0	U	
127-18-4	Tetrachloroethene	16,000 ~~2000~~	~~E~~	*
591-78-6	2-Hexanone	10	U	
124-48-1	Dibromochloromethane	5.0	U	
106-93-4	1,2-Dibromoethane	5.0	U	
108-90-7	Chlorobenzene	5.0	U	
100-41-4	Ethylbenzene	5.0	U	
179601-23-1	m,p-Xylene	5.0	U	
95-47-6	o-Xylene	5.0	U	
100-42-5	Styrene	5.0	U	
75-25-2	Bromoform	5.0	U	
98-82-8	Isopropylbenzene	5.0	U	
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U	
541-73-1	1,3-Dichlorobenzene	5.0	U	
106-46-7	1,4-Dichlorobenzene	5.0	U	
95-50-1	1,2-Dichlorobenzene	5.0	U	
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U	
120-82-1	1,2,4-Trichlorobenzene	5.0	U	
87-61-6	1,2,3-Trichlorobenzene	5.0	U	

*TRANSFERRED FROM DILUTION.

119

6w02A

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3RS1

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-08A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2307.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/24/2007

% Moisture: not dec. Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L Purge Volume: 10.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01		Unknown-01	2.946	5.2	J
	E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

120

Gw03

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RS4

Lab Name: MITKEM CORPORATION

Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113

Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER

Lab Sample ID: F0076-09A

Sample wt/vol: 5.00 (g/mL) ML

Lab File ID: V2J2324.D

Level: (TRACE/LOW/MED) LOW

Date Received: 01/24/2007

% Moisture: not dec.

Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U J
74-87-3	Chloromethane	5.0	U J
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U J
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	10	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	10	U
74-97-5	Bromochloromethane	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	~~100~~	~~U~~ R

121

GW-03

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RS4

Lab Name: MITKEM CORPORATION | Contract: EP-W-05-030

Lab Code: MITKEM | Case No.: 36113 | Mod. Ref No.: | SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER | Lab Sample ID: F0076-09A

Sample wt/vol: 5.00 (g/mL) ML | Lab File ID: V2J2324.D

Level: (TRACE/LOW/MED) LOW | Date Received: 01/24/2007

% Moisture: not dec. | Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) | Dilution Factor: 1.0

Soil Extract Volume: (uL) | Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-01-6	Trichloroethene	8.8	
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0 ~~2.8~~	~~BJ~~ U
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
95-47-6	o-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

122

Gw03

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3RS4

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER   Lab Sample ID: F0076-09A

Sample wt/vol: 5.00 (g/mL) ML   Lab File ID: V2J2324.D

Level: (TRACE or LOW/MED) LOW   Date Received: 01/24/2007

% Moisture: not dec.   Date Analyzed: 01/26/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L   Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1]EPA-designated Registry Number.

123

GW04

EPA SAMPLE NO.

B3RS7

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-01A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2230.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/23/2007

% Moisture: not dec. Date Analyzed: 01/23/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	10	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	2.2	J
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	160	
78-93-3	2-Butanone	10	U
74-97-5	Bromochloromethane	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	~~100~~	~~U~~ R

124

SOM01.1 (5/2005)

GW04

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RS7

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: ______ SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-01A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2230.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/23/2007

% Moisture: not dec. Date Analyzed: 01/23/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: ______ (uL) Soil Aliquot Volume: ______ (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-01-6	Trichloroethene	2900 ~~1300~~	~~E~~ *
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	220 ~~210~~	~~E~~ *
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
95-47-6	o-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U J
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

* TRANSFERRED FROM DILUTION.

125

Gw04.

1J - FORM I VOA-TIC

VOLATILE ORGANICS ANALYSIS DATA SHEET

TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RS7

Lab Name: MITKEM CORPORATION | Contract: EP-W-05-030

Lab Code: MITKEM | Case No.: 36113 | Mod. Ref No.: | SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER | Lab Sample ID: F0076-01A

Sample wt/vol: 5.00 (g/mL) ML | Lab File ID: V2J2230.D

Level: (TRACE or LOW/MED) LOW | Date Received: 01/23/2007

% Moisture: not dec. | Date Analyzed: 01/23/2007

GC Column: DB-624 ID: 0.25 (mm) | Dilution Factor: 1.0

Soil Extract Volume: (uL) | Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L | Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796 [1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

126

Gw05

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RT0

Lab Name: MITKEM CORPORATION | Contract: EP-W-05-030

Lab Code: MITKEM | Case No.: 36113 | Mod. Ref No.: | SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER | Lab Sample ID: F0076-10A

Sample wt/vol: 5.00 (g/mL) ML | Lab File ID: V2J2325.D

Level: (TRACE/LOW/MED) LOW | Date Received: 01/24/2007

% Moisture: not dec. | Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) | Dilution Factor: 1.0

Soil Extract Volume: (uL) | Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	1.1	J
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	10	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	10	U
74-97-5	Bromochloromethane	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	~~100~~	~~U~~ R

127

GU05

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RT0

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-10A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2325.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/24/2007

% Moisture: not dec. Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-01-6	Trichloroethene	46	
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0 ~~2.3~~	~~BJ~~ U
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
95-47-6	o-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

128

GWO5

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RT0

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER   Lab Sample ID: F0076-10A

Sample wt/vol: 5.00 (g/mL) ML   Lab File ID: V2J2325.D

Level: (TRACE or LOW/MED) LOW   Date Received: 01/24/2007

% Moisture: not dec.   Date Analyzed: 01/26/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L   Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

GW06

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RT3

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-11A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2326.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/24/2007

% Moisture: not dec. Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	10	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	10	U
74-97-5	Bromochloromethane	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	~~100~~	~~U~~ R

130

6w06

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RT3

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-11A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2326.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/24/2007

% Moisture: not dec. Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-01-6	Trichloroethene	18	
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0 ~~1.5~~	~~BJ~~ U
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
95-47-6	o-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

131

6W06

1J - FORM I VOA-TIC

VOLATILE ORGANICS ANALYSIS DATA SHEET

TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RT3

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-11A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2326.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/24/2007

% Moisture: not dec. Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

132

6u07

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RT6

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-02A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2231.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/23/2007

% Moisture: not dec. Date Analyzed: 01/23/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	76	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	10	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U J
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	6.7	
156-59-2	cis-1,2-Dichloroethene	29	J
78-93-3	2-Butanone	10	U
74-97-5	Bromochloromethane	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	~~100~~	~~U~~ R

173

~~136~~

SOM01.1 (5/2005)

GW07

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RT6

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-02A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2231.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/23/2007

% Moisture: not dec. Date Analyzed: 01/23/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-01-6	Trichloroethene	73	
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	4500 ~~1300~~	~~E~~ *
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
95-47-6	o-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U J
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

*TRANSFERRED FROM DILUTION.

134

~~0144~~

6w07

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3RT6

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER   Lab Sample ID: F0076-02A

Sample wt/vol: 5.00 (g/mL) ML   Lab File ID: V2J2231.D

Level: (TRACE or LOW/MED) LOW   Date Received: 01/23/2007

% Moisture: not dec.   Date Analyzed: 01/23/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L   Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

135

6-08

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RT9

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-03A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2232.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/23/2007

% Moisture: not dec. Date Analyzed: 01/23/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	14	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	10	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	31	
78-93-3	2-Butanone	10	U
74-97-5	Bromochloromethane	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	~~100~~	~~U~~ R

136

GW08

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RT9

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-03A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2232.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/23/2007

% Moisture: not dec. Date Analyzed: 01/23/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-01-6	Trichloroethene	33	
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	1,500 ~~990~~	~~E~~ *
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
95-47-6	o-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U J
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

* TRANSFERRED FROM DILUTION.

GW08

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RT9

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-03A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2232.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/23/2007

% Moisture: not dec. Date Analyzed: 01/23/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796 [1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

138

GW09

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RW2

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-14A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2313.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	10	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	10	U
74-97-5	Bromochloromethane	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	~~100~~	~~U~~ R

139

GW09

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RW2

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-14A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2313.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0 ~~4.9~~	~~J~~ U
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
95-47-6	o-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

140

Gw09

1J - FORM I VOA-TIC

VOLATILE ORGANICS ANALYSIS DATA SHEET

TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RW2

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-14A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2313.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

141

6w13

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RX5

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-15A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2314.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	26	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	10	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	10	U
74-97-5	Bromochloromethane	5.0	U
67-66-3	Chloroform	5.0 ~~2.4~~	~~J~~ U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	~~100~~	~~U~~ R

142

~~8194~~

Gw-3

EPA SAMPLE NO.

B3RX5

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-15A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2314.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	690 ~~520~~	~~E~~ *
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
95-47-6	o-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

* TRANSFERRED FROM DILUTION.

143

6w13

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RX5

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-15A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2314.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796 [1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

144

6w14

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RX8

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-16A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2315.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	31	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	10	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	3.6	J
78-93-3	2-Butanone	10	U
74-97-5	Bromochloromethane	5.0	U
67-66-3	Chloroform	5.0 ~~3.3~~	~~J~~ U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	~~100~~	~~U~~ R

145

GW141

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RX8

Lab Name: MITKEM CORPORATION　Contract: EP-W-05-030

Lab Code: MITKEM　Case No.: 36113　Mod. Ref No.: 　SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER　Lab Sample ID: F0076-16A

Sample wt/vol: 5.00 (g/mL) ML　Lab File ID: V2J2315.D

Level: (TRACE/LOW/MED) LOW　Date Received: 01/25/2007

% Moisture: not dec.　Date Analyzed: 01/26/2007

GC Column: DB-624　ID: 0.25 (mm)　Dilution Factor: 1.0

Soil Extract Volume: (uL)　Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	680 ~~750~~	~~E~~ *
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
95-47-6	o-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

* TRANSFERRED FROM DILUTION.

146

Gw14

1J - FORM I VOA-TIC

VOLATILE ORGANICS ANALYSIS DATA SHEET

TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RX8

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-16A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2315.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796 [1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

147

R-001

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RY3 FIELD BLANK

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-04A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2235.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/23/2007

% Moisture: not dec. Date Analyzed: 01/23/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	10	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	10	U
74-97-5	Bromochloromethane	5.0	U
67-66-3	Chloroform	2.7	J
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	~~100~~	~~U~~ R

(148)

RINO1

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RY3

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-04A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2235.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/23/2007

% Moisture: not dec. Date Analyzed: 01/23/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	4.6	J
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
95-47-6	o-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U J
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

149

Riw 01

1J - FORM I VOA-TIC

VOLATILE ORGANICS ANALYSIS DATA SHEET

TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RY3

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-04A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2235.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/23/2007

% Moisture: not dec. Date Analyzed: 01/23/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

150

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RY4 FIELD BLANK

Lab Name: MITKEM CORPORATION		Contract: EP-W-05-030	
Lab Code: MITKEM	Case No.: 36113	Mod. Ref No.:	SDG No.: B3RS7
Matrix: (SOIL/SED/WATER) WATER		Lab Sample ID: F0076-12A	
Sample wt/vol: 5.00 (g/mL) ML		Lab File ID: V2J2327.D	
Level: (TRACE/LOW/MED) LOW		Date Received: 01/24/2007	
% Moisture: not dec.		Date Analyzed: 01/26/2007	
GC Column: DB-624	ID: 0.25 (mm)	Dilution Factor: 1.0	
Soil Extract Volume: (uL)		Soil Aliquot Volume: (uL)	
Purge Volume: 5.0 (mL)			

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U J
74-87-3	Chloromethane	5.0	U J
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U J
75-00-3	Chloroethane	5.0	U J
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	10	U
75-15-0	Carbon disulfide	5.0	U J
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	10	U
74-97-5	Bromochloromethane	5.0	U
67-66-3	Chloroform	3.0	J
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	~~100~~	~~U~~ R

151

RIN02

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3RY4

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030
Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS7
Matrix: (SOIL/SED/WATER) WATER   Lab Sample ID: F0076-12A
Sample wt/vol: 5.00 (g/mL) ML   Lab File ID: V2J2327.D
Level: (TRACE/LOW/MED) LOW   Date Received: 01/24/2007
% Moisture: not dec.   Date Analyzed: 01/26/2007
GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0
Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)
Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	2.0	BJ
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
95-47-6	o-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

152

Riw 02

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RY4

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-12A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2327.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/24/2007

% Moisture: not dec. Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1]EPA-designated Registry Number.

153

R\u03

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3RY5 FIELD BLANK

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030
Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7
Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-17A
Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2329.D
Level: (TRACE/LOW/MED) LOW Date Received: 01/25/2007
% Moisture: not dec. Date Analyzed: 01/26/2007
GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0
Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)
Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	10	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	10	U
74-97-5	Bromochloromethane	5.0	U
67-66-3	Chloroform	3.0	J
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	~~100~~	~~U~~ R

154

~~0251~~

R1W03

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RY5

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER   Lab Sample ID: F0076-17A

Sample wt/vol: 5.00 (g/mL) ML   Lab File ID: V2J2329.D

Level: (TRACE/LOW/MED) LOW   Date Received: 01/25/2007

% Moisture: not dec.   Date Analyzed: 01/26/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	1.5	BJ
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
95-47-6	o-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

155

Rıw03

EPA SAMPLE NO.

B3RY5

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER   Lab Sample ID: F0076-17A

Sample wt/vol: 5.00 (g/mL) ML   Lab File ID: V2J2329.D

Level: (TRACE or LOW/MED) LOW   Date Received: 01/25/2007

% Moisture: not dec.   Date Analyzed: 01/26/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L   Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

156

7B01

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RY6 TRIP BLANK

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-05A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2236.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/23/2007

% Moisture: not dec. Date Analyzed: 01/23/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	10	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	10	U
74-97-5	Bromochloromethane	5.0	U
67-66-3	Chloroform	3.0	J
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	~~100~~	~~U~~ R

157

TB01

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RY6

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-05A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2236.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/23/2007

% Moisture: not dec. Date Analyzed: 01/23/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	3.0	J
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
95-47-6	o-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U J
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

158

~~0261~~

T001

EPA SAMPLE NO.

B3RY6

1J - FORM I VOA-TIC

VOLATILE ORGANICS ANALYSIS DATA SHEET

TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER   Lab Sample ID: F0076-05A

Sample wt/vol: 5.00 (g/mL) ML   Lab File ID: V2J2236.D

Level: (TRACE or LOW/MED) LOW   Date Received: 01/23/2007

% Moisture: not dec.   Date Analyzed: 01/23/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L   Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

159

TB02

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RY7 TRIP BLANK

Lab Name: MITKEM CORPORATION　Contract: EP-W-05-030

Lab Code: MITKEM　Case No.: 36113　Mod. Ref No.: 　SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER　Lab Sample ID: F0076-13A

Sample wt/vol: 5.00 (g/mL) ML　Lab File ID: V2J2328.D

Level: (TRACE/LOW/MED) LOW　Date Received: 01/24/2007

% Moisture: not dec.　Date Analyzed: 01/26/2007

GC Column: DB-624　ID: 0.25 (mm)　Dilution Factor: 1.0

Soil Extract Volume: (uL)　Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	10	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	10	U
74-97-5	Bromochloromethane	5.0	U
67-66-3	Chloroform	3.1	J
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	~~100~~	~~U~~ R

160

TB02

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3RY7

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-13A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2328.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/24/2007

% Moisture: not dec. Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	1.9	~~J~~ J
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
95-47-6	o-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

161

T002

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RY7

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER   Lab Sample ID: F0076-13A

Sample wt/vol: 5.00 (g/mL) ML   Lab File ID: V2J2328.D

Level: (TRACE or LOW/MED) LOW   Date Received: 01/24/2007

% Moisture: not dec.   Date Analyzed: 01/26/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L   Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1]EPA-designated Registry Number.

162

TB03

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RY8 TRIP BLANK

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-18A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2317.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	10	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	10	U
74-97-5	Bromochloromethane	5.0	U
67-66-3	Chloroform	3.0	J
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
123-91-1	1,4-Dioxane	~~100~~	~~U~~ R

163

TB03

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3RY8

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: F0076-18A

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: V2J2317.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/25/2007

% Moisture: not dec. Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	3.2	J
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
95-47-6	o-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
87-61-6	1,2,3-Trichlorobenzene	5.0	U

164

-TB03

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3RY8

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS7

Matrix: (SOIL/SED/WATER) WATER   Lab Sample ID: F0076-18A

Sample wt/vol: 5.00 (g/mL) ML   Lab File ID: V2J2317.D

Level: (TRACE or LOW/MED) LOW   Date Received: 01/25/2007

% Moisture: not dec.   Date Analyzed: 01/26/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L   Purge Volume: 10.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01		Unknown-01	3.495	9.8	J
	E966796[1]	Total Alkanes	N/A	0	J

[1]EPA-designated Registry Number.

165

Agnes Ng

From: "Rudolph, Elizabeth" <erudolph@fedcsc.com>
To: "Agnes Ng (E-mail)" <agnes_ng@mitkem.com>
Cc: "Adly Michael" <Michael.adly@epamail.epa.gov>; "Jennifer Feranda" <feranda.jennifer@epa.gov>
Sent: Friday, January 26, 2007 14:01
Subject: Region 2 | Case 36113 | Lab MITKEM | Issue Multiple | FINAL

Agnes,

This is Keri Schaffer, Beth is out of the office today.

*** Summary Start ***

- Non-standard matrix -

Issue 1: Aqueous VOA sample numbers B3RS7, B3RT6, B3RT9, B3RR6, B3RS0,B3RS1, B3RS4, B3RT0, B3RT3, B3RW2, B3RX5 and B3RX8 were received with sediment in the vials. The Sediment may interfere with the DMC recoveries.
Resolution 1: Per Region 2, the laboratory will do their best to avoid the sediment in the samples and note the issue in the SDG Narrative.

- Non-sampler Issues -

Issue 2: The samples were missing sample tags.
Resolution 2: In accordance with previous direction from Region 2, the laboratory will note the issue in the SDG Narrative and proceed with the analysis of the samples.

*** Summary End ***

Please contact me if you have any further questions.

Thank you,

Keri Schaffer for

Beth Rudolph
Computer Sciences Corporation (CSC)
erudolph@fedcsc.com
703-818-4215

-----Original Message-----
From: Michael.Adly@epamail.epa.gov [mailto:Michael.Adly@epamail.epa.gov]
Sent: Friday, January 26, 2007 1:38 PM
To: Rudolph, Elizabeth
Cc: feranda.jennifer@epa.gov
Subject: Re: New Issue #4 | Case 36113 | Lab MITKEM | Issue Multiple

166

0419

Keri,

Regarding issue #1, please advise the lab to proceed with the analysis
the samples, and do their best to avoid the sediment in the samples.
s issue must be noted in the SDG narrative.

Thanks.

Adly A. Michael
Region 2 - HWSB - HWSS
Phone: (732) 906-6161
Fax: (732) 321-6622

"Rudolph, Elizabeth" <erudolph@fedcsc.com>

01/26/2007 12:59 PM

To
Adly Michael/R2/USEPA/US@EPA, Jennifer Feranda/R2/USEPA/US@EPA

cc

Subject
New Issue #4 | Case 36113 | Lab MITKEM | Issue Multiple

Adly,

This is Keri Schaffer, Beth is out of the office today.

MITKEM has reported the following issues. Issue 2 may be resolved using a standard answer. Please advise on how the lab should proceed for issue 1.

- Non-standard matrix -

Issue 1: Aqueous VOA sample numbers B3RS7, B3RT6, B3RT9, B3RR6, B3RS0, B3RS1, B3RS4, B3RT0, B3RT3, B3RW2, B3RX5 and B3RX8 were received with sediment in the vials. The Sediment may interfere with the DMC recoveries.

- Non-sampler -

Issue 2: The samples were missing sample tags.
Resolution 2: In accordance with previous direction from Region 2, the laboratory will note the issue in the SDG Narrative and proceed with the analysis of the samples.

e contact me if you have any questions.

Thank you,

167

~~0420~~

Keri Schaffer for

Beth Rudolph
Computer Sciences Corporation (CSC)
erudolph@fedcsc.com
703-818-4215

-----Original Message-----
From: Agnes Ng [mailto:agnes_ng@mitkem.com]
Sent: Friday, January 26, 2007 12:41 PM
To: Rudolph, Elizabeth
Subject: Region 2 Case 36113 Case B3RS7

Hi Beth,

1. For the following aqueous samples scheduled for VOA analysis, there was sediment in all the vials for each sample: B3RS7, B3RT6, B3RT9, B3RR6, B3RS0, B3RS1, B3RS4, B3RT0, B3RT3, B3RW2, B3RX5 and B3RX8. The sediment in the vials may interfere with DMC recoveries.

2. We did not receive any tags with the samples.

Thanks,
Agnes Ng
CLP Project Manager
(p) 401-732-3400
(f) 401-732-3499
****

Functional Guidelines for Evaluating Organic Analysis

CASE No.: 36113		SDG No.: B3RS5
LABORATORY:	MITKEM	SITE: WALLACE INTERNATIONAL
SAMPLER:	W-SAT	ANALYSIS: 20 SOIL VOA

DATA ASSESSMENT

The current SOP HW-33A/VOA (Revision 0) April 2006, USEPA Region II Data Validation SOP for Statement of Work SOM01.1 for evaluating organic data has been applied.

All data are valid and acceptable except those analytes rejected "R"(unusable). Due to the detection of QC problems, some analytes may have the "J" (estimated), "N"(presumptive evidence for the presence of the material, "U" (non-detect) or "JN" (presumptive evidence for the presence of the material at an estimated value) flag. All action is detailed on the attached sheets.

The "R" flag means that the associated value is unusable. In other words, significant data bias is evident and the reported analyte concentration is unreliable.

Reviewer's Signature: Charlene M. Alaimo — Date: February / 16 /2007

Peer Reviewer's Signature: C. Stamo — Date: 2 / 16 /2007

Verified By: J Karras — Date: 02 / 16 /2007

SDG#B3RS5

1. **HOLDING TIME:**

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded.
The following action was taken in the samples and analytes shown due to excessive holding time.

No problems found for this qualification.

2. **DMC's**

All samples are spiked with surrogate compounds (DMC's) prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate concentrations were outside contract specifications, qualifications were applied to the samples and analytes as shown below.

The following volatile samples have DMC/SMC recoveries below the expanded lower limit of the criteria window (less than 20%).
Hits are qualified "J" and non-detects are qualified "R".

B3RR7ME, B3RR8ME, B3RR9ME, B3RS5ME, B3RT5ME
Chloroethane-d5: Bromomethane, Carbon disulfide, Chloroethane, Chloromethane, Dichlorodifluoromethane

B3RT1, B3RT7RE
2-Butanone-d5: 2-Butanone, Acetone

The following volatile samples have DMC/SMC recoveries below the lower limit of the criteria window, but greater than 20%.
Hits are qualified "J" and non-detects are qualified "UJ".

B3RR5ME, B3RS6ME
Chloroethane-d5: Bromomethane, Carbon disulfide, Chloroethane, Chloromethane, Dichlorodifluoromethane

B3RT5ME
1,1-Dichloroethene-d2: cis-1,2-Dichloroethene, trans-1,2-Dichloroethene

B3RT7RE
Trans-1,3-Dichloropropene-d4: 1,1,2-Trichloroethane, cis-1,3-Dichloropropene, trans-1,3-Dichloropropene

The following volatile samples have DMC/SMC recoveries above the upper limit of the criteria window.
Hits are qualified "J" and non-detects are not qualified.

B3RT1, B3RT1RE, B3RT7, B3RT7RE, B3RY0
Benzene-d6: Benzene

B3RT1RE, B3RT4, B3RT7RE, B3RX9, B3RY0, B3RY1, VHBLK5N
1,4-Dioxane-d8: 1,4-Dioxane

B3RT1, B3RT1RE
Chloroethane-d5: Bromomethane, Carbon disulfide, Chloroethane, Chloromethane, Dichlorodifluoromethane

B3RT1, B3RT1RE, B3RT7, B3RT7RE
Toluene-d8: Ethylbenzene, Isopropylbenzene, Styrene, Tetrachloroethene, Toluene, Trichloroethene, m,p-Xylene, o-Xylene

B3RS5ME, B3RT1, B3RT1RE, B3RT5ME
Vinyl chloride-d3: Vinyl chloride

B3RT7
Trans-1,3-Dichloropropene-d4: 1,1,2-Trichloroethane, cis-1,3-Dichloropropene, trans-1,3-Dichloropropene

B3RT1, B3RT1RE, B3RT7, B3RT7RE, B3RY0, B3RY1
1,2-Dichloropropane-d6: 1,2-Dichloropropane, Bromodichloromethane, Cyclohexane, Methylcyclohexane

3. **MATRIX SPIKE/SPIKE DUPLICATE, MS/MSD:**

The MS/MSD data are generated to determine the long-term precision and accuracy of the analytical method in various matrices. The MS/MSD may be used in conjunction with other QC criteria for additional qualification of data.

Not Applicable.

4. **BLANK CONTAMINATION:**

Quality assurance (QA) blanks, i.e., method, trip, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Trip blanks measure cross-contamination of samples during shipment. Field and rinse blanks measure cross-contamination of samples during field operations. If the concentration of the analyte is less than 1 times the blank contaminant level (2 times for common contaminants), the analytes are qualified as non-detects, "U". The following analytes in the sample shown were qualified with "U" for these reasons:

A) Method blank contamination:

No problems found for this qualification.

B) Field or rinse blank contamination:

DC-x The following volatile samples have analyte concentrations reported below the CRQL and less than or equal to one time (1X) the associated field blank concentration. Reported sample concentrations have been elevated to the CRQL.
Hits are qualified "U" and non-detects are not flagged.

Tetrachloroethene
B3RR7ME

C) Trip blank contamination for VOA aqueous samples:

No problems found for this qualification.

D) Storage Blank associated with VOA samples only

No problems found for this qualification.

E) Tics "R" rejected:

No problems found for this qualification.

5. MASS SPECTROMETER TUNING:

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances. The tuning standard for volatile organics is (BFB) Bromofluorobenzene.

If the mass calibration is in error, all associated data will be classified as unusable "R".

No problems found for this qualification.

6. CALIBRATION:

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration checks document that the instrument is giving satisfactory daily performance.

A) Response Factor GC/MS:

The response factor measures the instrument's response to specific chemical compounds. The response factor for the Target Compound List (TCL) must be ≥ 0.05, and ≥ 0.01 for the twenty-two analytes with poor response in both the initial and continuing calibrations. A value < 0.05, or < 0.01 for the poor performers indicates a serious detection and quantitation problem (poor sensitivity). Analytes detected in the sample will be qualified as estimated, "J". All non-detects for that compound will be rejected "R".

DC-x The following volatile samples are associated with an initial average relative response factor (RRF) outside expanded criteria.
Hits are qualified "J" and non-detects are flagged "R".

1,4-Dioxane, 1,4-Dioxane-d8
B3RR4, B3RR5, B3RR5ME, B3RR7, B3RR7ME, B3RR8, B3RR8ME, B3RR9, B3RR9ME, B3RS2, B3RS3, B3RS5, B3RS5ME, B3RS6, B3RS6ME, B3RS8, B3RS9, B3RT1, B3RT1RE, B3RT2, B3RT4, B3RT5, B3RT5ME, B3RT7, B3RT7RE, B3RT8, B3RX9, B3RY0, B3RY1, VBLK20, VBLK5E, VBLK5F, VBLK5G, VBLK5L, VHBLK5N

DC-x The following volatile samples are associated with an **opening** and/or **closing** continuing calibration verification (CCV) response factor (RF50) outside expanded criteria.
Hits are qualified "J" and non-detects are qualified "R".

1,4-Dioxane, 1,4-Dioxane-d8
B3RR4, B3RR5, B3RR5ME, B3RR7, B3RR7ME, B3RR8, B3RR8ME, B3RR9, B3RR9ME, B3RS2, B3RS3, B3RS5, B3RS5ME, B3RS6, B3RS6ME, B3RS8, B3RS9, B3RT1, B3RT1RE, B3RT2, B3RT4, B3RT5, B3RT5ME, B3RT7, B3RT7RE, B3RT8, B3RX9, B3RY0, B3RY1, VBLK20, VBLK5E, VBLK5F, VBLK5G, VBLK5L, VHBLK5N

B) Percent Relative Standard Deviation (%RSD) and Percent Difference (%D):

Percent RSD is calculated from the initial calibration and is used to indicate the stability of the specific compound response factor over increasing concentration. Percent D compares the response factor of the continuing calibration check to the mean response factor (RRF) from the initial calibration. Percent D is a measure of the instrument's daily performance. Percent RSD must be < 20%, < 40% for the poor performers, and < 50% for 1,4-Dioxane. %D must be < 25%, < 40% for the poor performers, and < 50% for 1,4-Dioxane. A value outside of these limits indicates potential detection and quantitation errors. For these reasons, all positive results are flagged as estimated, "J" and non-detects are flagged "UJ". If %RSD and %D grossly exceed QC criteria (> 90%), non-detects data may be qualified "R".

The following analytes in the sample shown were qualified for %RSD and %D:

DC-x The following volatile samples are associated with an initial calibration Percent Relative Standard Deviation (%RSD) outside primary criteria.
Hits are qualified "J" and non-detects are not qualified.

Bromomethane
B3RR4, B3RR5, B3RR5ME, B3RR7, B3RR7ME, B3RR8, B3RR8ME, B3RR9, B3RR9ME, B3RS2, B3RS3, B3RS5, B3RS5ME, B3RS6, B3RS6ME, B3RS8, B3RS9, B3RT1, B3RT2, B3RT4, B3RT5, B3RT5ME, B3RT7, B3RT7RE, B3RT8, B3RX9, B3RY0, B3RY1, VBLK20, VBLK5E, VBLK5F, VBLK5G

1,1,2,2-Tetrachloroethane
B3RT1RE, VBLK5L, VHBLK5N

DC-x The following volatile samples are associated with an opening or closing CCV percent difference (%D) outside criteria.
Hits are qualified "J" and non-detects are qualified "UJ".

4-Methyl-2-pentanone, 2-Hexanone, 1,2-Dibromo-3-chloropropane
B3RS3, B3RS8, B3RS9, B3RT1, B3RT2, VBLK5G

8. INTERNAL STANDARDS PERFORMANCE GC/MS:

Internal standards (IS) performance criteria ensure that the GC/MS sensitivity and response are stable during every experimental run. The internal standard area count must not vary by more than a factor of 2 (-50% to +200%) from the associated continuing calibration standard. The retention time of the internal standard must not vary more than ±30 seconds from the associated continuing calibration standard. If the area count is outside the (-50% to +200%) range of the associated standard, all of the positive results for compounds quantitated using that IS are qualified as estimated, "J", and all non-detects as "UJ", or "R" if there is a severe loss of sensitivity.

If an internal standard retention time varies by more than 30 seconds, the reviewer will use professional judgment to determine either partial or total rejection of the data for that sample fraction.

The following volatile samples have internal standard area counts that are outside the lower limit of primary criteria.
Hits are qualified "J" and non-detects are qualified "R".

B3RT1, B3RT1RE, B3RT7, B3RT7RE, B3RY1
1,4-Dichlorobenzene-d4: Bromoform, 1,3-Dichlorobenzene, 1,4-Dichlorobenzene, 1,2-Dichlorobenzene, 1,2-Dibromo-3-chloropropane, 1,2,4-Trichlorobenzene, and 1,2,3-Trichlorobenzene

9. COMPOUND IDENTIFICATION:

A) Volatile Fraction:

TCL compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and by comparison to the ion spectra obtained from known standards. For the results to be a positive hit, the sample peak must be within ± 0.06 RRT units of the standard compound and have ion spectra which has a ratio of the primary and secondary m/e intensities within 20% of that in the standard compound. For the tentatively identified compounds (TIC) the ion spectra must match accurately. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

No problems found for this qualification.

10. CONTRACT PROBLEMS NON-COMPLIANCE:

All samples had 1,4-Dioxane and 1,4-Dioxane-d8 average RRF and RRF50 values less than 0.01.
The Internal standard area count for B3RY1 was outside the acceptable range but was not reanalyzed.

11. FIELD DOCUMENTATION:

No problems found for this qualification.

12. OTHER PROBLEMS

No problems found for this qualification.

13. This package contains reextractions, reanalyses or dilutions. Upon reviewing the QA results, the following Form 1(s) is identified NOT to be used.

B3RR5ME, B3RR7ME, B3RR8ME, B3RR9ME, B3RS5ME, B3RS6ME, B3RT1, B3RT5ME, B3RT7RE

	YES	NO	N/A

PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 36113 LAB: Mitkem

SITE NAME: Wallace International SDG No(s).: B3R55

1.0 Chain of Custody and Sampling Trip Reports

	YES	NO	N/A
1.1 Are the Traffic Reports/Chain-of-Custody Records present for all samples?	[✓]	___	___

ACTION: If no, contact RSCC, or the TOPO to obtain replacement of missing or illegible copies from the lab.

	YES	NO	N/A
1.2 Is the Sampling Trip Report present for all samples?	[✓]	___	___

ACTION: If no, contact either RSCC or ask the TOPO to obtain the necessary information from the prime contractor.

2.0 Data Completeness and Deliverables

	YES	NO	N/A
2.1 Have any missing deliverables been received and added to the data package?	✓	[ ]	___

ACTION: Contact the TOPO to obtain an explanation or resubmittal of any missing deliverables from the lab. If lab cannot provide them, note the effect on the review of the data package in the Contract Problems/Non-compliance section of the Data Assessment.

	YES	NO	N/A
2.2 Was CLASS CCS checklist included with the package?	[✓]	___	___
2.3 Are there any discrepancies between the Traffic Reports/Chain-of-Custody Records, and Sampling Trip Report?	___	[✓]	___

	YES	NO	N/A

ACTION: If yes, contact the TOPO to obtain an explanation or resubmittal of any missing deliverables from the laboratory.

3.0 Cover Letter SDG Narrative

		YES	NO	N/A
3.1	Is the SDG Narrative or Cover Letter Present?	[✓]	___	___
3.2	Are case number, SDG number and contract number contained in the SDG Narrative or cover letter (see SOW, Exhibit B, section 2.5.1)? EPA sample numbers in the SDG, detailed documentation of any quality control, sample, shipment, and/or analytical problems encountered in processing the samples? Corrective action taken?	[✓]	___	___
3.3	Does the Narrative contain the following information SOM01.1, page B-12, section 2.5.1)? Description of trap, column used, storage of samples, case#, SDG#, analytical problems, and discrepancies between field and lab weights.	[✓]	___	___
3.4	Does the narrative, VOA section, contain a list of all TICs identified as alkanes and their estimated concentrations?	[✓]	___	___
3.5	Did the contractor record the temperature of the cooler on the Form DC-1, Item 9 - Cooler Temperature, and in the SDG Narrative?	[✓]	___	___
3.6	Does the narrative contain a list of the pH values determined for each water sample submitted for volatiles analysis (SOW, page B-13, section 2.5.1.2)?	[ ]	___	✓
3.7	Does the Case Narrative contain the "verbatim" statement (page B-12, section 2.5.1 of the SOM)?	[✓]	___	___

ACTION: If "No", to any question in this section, contact the TOPO to obtain necessary

	YES	NO	N/A

resubmittals. If unavailable, document under the Contract Problems/ Non-Compliance section of the Data Assessment.

4.0 Data Validation Checklist

4.1 Check the package for the following (see SOM reporting requirements, section 2.1, page B-10):

	YES	NO	N/A
a. Is the package paginated in ascending order starting from the SDG narrative?	[✓]	___	___
b. Are all forms and copies legible?	[✓]	___	___
c. Assembled in the order set forth in the SOW?	[✓]	___	___
Low/Med Concentration Volatiles Data present?	[✓]	___	

Action: Take action as specified in section 3.7 above.

PART A: Low/Medium Volatile ANALYSES

1.0 Sample Conditions/Problems

	YES	NO	N/A
1.1 Do the Traffic Reports/Chain-of-Custody Records, Sampling Trip Report or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data?	___	[✓]	___

ACTION: If samples were not iced or the ice was melted upon arrival at the laboratory and the temperature of the cooler was > 10° C, then flag all positive results with a "J" and all non-detects "UJ".

ACTION: If both VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

YES NO N/A

. . . .

2.0 Holding Times

2.1 Have any VOA technical holding times, determined from date of collection to date of analysis, been exceeded? ___ [✓] ___

2.2 Preservation: Aqueous samples must be preserved with HCL to pH of 2 or below and cooled at 4°C ± 2°C. Non-aqueous samples: frozen (less than -7°C) or properly cooled (4°C ± 2°C) and preserved with $NaHSO_4$.

Action: Qualify sample results according to the following table.

Holding Time Actions for Low/Medium Volatile Analyses

Matrix	Preserved	Criteria	ACTION: Detected Associated Compounds	ACTION: Non-Detected Associated Compounds
Aqueous	No	≤ 7 Days	NO Action	
	No	> 7 Days	J	R
	Yes	≤ 14 Days	No Action	
	Yes	> 14 Days	J	R
Non-Aqueous	No	≤ 14 Days	J	R
	Yes	≤ 14 Days	No Action	
	Yes/No	> 14 Days	J	R

178

	YES	NO	N/A
3.0 Deuterated Monitoring Compound (DMC) Recovery (Form II)			
3.1 Are the Volatile SMC Recovery Summaries (Form II present?	[✓]	___	___
ACTION: Contact the TOPO to obtain an explanation/resubmittal from the lab. If missing deliverables are unavailable, document the effect in the Data Assessment.			
3.2 Were outliers marked correctly with an asterisk?	[✓]	___	___
ACTION: Circle all outliers in red.			
3.3 Were more than three of the fourteen (14) Deuterated Monitoring Compounds (DMC's) recoveries outside their corresponding limits?	✓	[ ]	___
If yes, were samples re-analyzed?	[✓]	___	___
Were method blanks re-analyzed?	[✓]	___	___

ACTION: If any DMC is outside the required limits (see Table below), qualify their associated target compounds (See Table below) as follows:

VOLATILE DMC AND THEIR ASSOCIATED TARGET COMPOUNDS

Chloroethane-d5	1,2-Dichloropropane-d6	1,2-Dichlorobenzene-d4
Dichlorodifluoromethane	Cyclohexane	Chlorobenzene
Chloromethane	Methylcyclohexane	1,3-Dichlorobenzene
Bromomethane	1,2-Dichloropropane	1,4-Dichlorobenzene
Chloroethane	Bromodichloromethane	1,2-Dichlorobenzene
Carbon Disulfide		1,2,4-Trichlorobenzene
		1,2,3-Trichlorobenzene

<u>1,4-Dioxane-d8</u> 1,4-Dioxane	<u>trans-1,3-Dichloropropene-d4</u> cis-1,3-Dichloropropene trans-1,3-Dichloropropene 1,1,2-Trichloroethane	<u>Chloroform-d</u> 1,1-Dichloroethane Bromochloromethane Chloroform Dibromochloromethane Bromoform
<u>2-Butanone-d5</u> Acetone 2-butanone	<u>1,1-dichloroethene-d2</u> trans-1,2-Dichloroethene cis-1,2-Dichloroethene	<u>2-Hexanone-d5</u> 4-Methyl-2-pentanone 2-Hexanone
<u>Vinyl Chloride-d3</u> Vinyl Chloride	<u>Benzene-d6</u> Benzene	<u>1,1,2,2-Tetrachloroethane-d2</u> 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane
<u>1,2-Dichloroethane-d4</u> Trichlorofluoromethane 1,1-Dichloroethene 1,1,2-Trichloro-1,2,2-trifluoroethane Methyl Acetate Methylene Chloride Methyl tert-Butyl Ether Carbon Tetrachloride 1,2-Dichloroethane 1,1,1-Trichloroethane 1,2-Dibromoethane	<u>Toluene-d8</u> Trichloroethene Toluene Tetrachloroethene Ethylbenzene o-Xylenes m,p-Xylene Styrene Isopropylbenzene	

180

YES NO N/A

VOLATILE DEUTERATED MONITORING COMPOUND RECOVERY LIMITS

DMC	Recovery Limits (%) for Water Samples	Recovery Limits (%) for Soil samples
Vinyl Chloride-d3	65 - 131	68 - 122
Chloroethane-d5	71 - 131	61 - 130
1,1-Dichloroethene-d2	55 - 104	45 - 132
2-Butanone-d5	49 - 155	20 - 182
Chloroform-d	78 - 121	72 - 123
1,2-Dichloroethane-d4	78 - 129	79 - 122
Benzene-d6	77 - 124	80 - 121
1,2-Dichloropropane-d6	79 - 124	74 - 124
Toluene-d8	77 - 121	78 - 121
trans-1,3-Dichloropropene-d4	73 - 121	72 - 130
2-Hexanone-d5	28 - 135	17 - 184
1,4-Dioxane-d8	50 - 150	50 - 150
1,1,2,2-Tetrachloroethane-d2	73 - 125	56 - 161
1,2-Dichlorobenzene-d4	80 - 131	70 - 131

1. For any recovery greater than the upper limit:

   a. Qualify "J" all positive associated target compounds.
   b. Do not qualify associated non-detects.

2. For any recovery greater than or equal to 20%, but less than the lower limit:

   a. Qualify "J" all positive associated target compounds.

YES NO N/A

. . . .

b. Qualify "UJ" associated non-detects.

3. For any recovery less than 20%:

a. Qualify "J" all positive associated target compounds.
b. Qualify "R" all associated non-detects.

NOTE: Up to three (3) DMC's per sample, excluding 1,4-Dioxane-d8, may fail to meet the recovery limits. (SOM, sec. 11.3.4, pg. D-45/Low Medium VOA). Recovery limits for 1,4-Dioxane-d8 are advisory.
As per SOM, any sample which has more than 3 DMC's outside the limits, it must be reanalyzed (SOM sec. 11.4.3.1 pg. D-46/Low Medium VOA).

ACTION: Note in the Data Assessment under Contract Problems/ Non-Compliance if the Lab did not perform reanalysis.

3.4 Are there any transcription/calculation errors between raw data and form II? ___ [✓] ___

ACTION: If large errors exist, ask the TOPO to obtain an explanation/resubmittal from the lab, make any necessary corrections and note errors in the data assessment.

4.0 <u>Matrix Spike/Matrix Spike Duplicate Recovery (Form III)</u>
Note: Data for MS/MSD will not be present unless requested.

4.1 Are the MS/MSD Recovery Forms (Form III Low/Med VOA) present? [ ] ___ ✓

4.2 Was the MS/MSD analyzed at the required frequency (once per SDG, or every 20 samples, whichever is more frequent)? [ ] ___ ✓

ACTION: If any MS/MSD data are missing, take action as specified in section 3.1 above.

ACTION: No action is taken on MS/MSD data <u>alone.</u> However, using professional judgement, the validator may use the MS and MSD results in conjunction with other

	YES	NO	N/A

QC criteria and determine the need for some qualification of the data.

5.0 Method Blanks (Form IV)

	YES	NO	N/A
5.1 Is the Volatile Method Blank Summary (Form IV VOA) present for aqueous and soil samples?	[✓]	___	___
5.2 Frequency of Analysis: For the analysis of Low/Med Concentration VOA TCL compounds, has a method blank been analyzed for each SDG or every 20 samples, whichever is more frequent?	[✓]	___	___
5.3 Has a VOA method blank been analyzed after the calibration standards and once every 12 hours time period for each GC/MS instrument used?	[✓]	___	___
5.4 Was a VOA instrument blank analyzed after each sample/dilution that contains a target compound exceeding the initial calibration range (see SOM, page D-48/Low/Medium VOA, section 12.1.1.3)?	[✓]	___	___

ACTION: If any method/instrument blank data are missing, notify the TOPO to obtain resubmittals or an explanation from the lab. If method blank data are unavailable, the reviewer may use professional judgement, or substitute field blank or trip blank data for missing method blank data.

If an instrument blank was not analyzed after a sample containing a target analyte exceeding the initial calibration standards, inspect the sample chromatogram acquired immediately after this sample for possible carryover. The system is considered uncontaminated if the target analyte is below CRQL. Use professional judgement to determine if carryover occurred and qualify analyte(s) accordingly.

	YES	NO	N/A
5.5 Was a storage blank analyzed once per SDG after all the samples were analyzed?	[✓]	___	___

YES NO N/A

. . . .

ACTION: If storage blank data is missing, contact the TOPO to obtain any missing deliverables from the laboratory. If unavailable, note in the Contract Problems/Non-Compliance section of the Data Assessment.

5.6 The validator should verify that the correct identification scheme for EPA blanks was used. (See SOM page B-39, section 3.3.7.3 for more information.)

Was the correct identification scheme used for all Low/Med VOA blanks? [✓] ___ ___

ACTION: Contact the TOPO to obtain corrections from the lab, or make the necessary corrections. Document in the "Contract Problems/Non-Compliance section of the Data Assessment all corrections made by the validator.

5.7 Chromatography: review the blank raw data - chromatograms (RICs), quant. reports, data system printouts and spectra.

Also compare the storage blank raw data with the method blank. Determine if contamination in the storage blank is also present in the method blank.

Is the chromatographic performance (baseline stability) for each instrument acceptable for Low/Med VOAs? [✓] ___ ___

ACTION: Use professional judgement to determine the effect on the data.

5.8 Are all detected hits for target compounds in method, and storage blanks less than the CRQL? [✓] ___ ___

Exception: Methylene Chloride, Acetone and 2-butanone must be less than 2X times their respective CRQLs.

ACTION: If no, an explanation and laboratory's corrective actions must be addressed in the case narrative. If the narrative contains no explanation, then make a note in the Contract Problems/Non-Compliance section of the Data Assessment.

	YES	NO	N/A

6.0 Contamination

NOTE: "Water blanks", "drill blanks", and distilled water blanks" are validated like any other sample, and are not used to qualify data. Do not confuse them with the other QC blanks discussed below.

		YES	NO	N/A
6.1	Does the storage blank contain positive results (TCL and/or TICs) for Low/Med Concentration VOAs?	___	[✓]	___
6.2	Do any method/reagent/instrument blanks contain positive results (including TICs) for Low/Med Concentration VOAs?	✓	[ ]	___

NOTE: Contaminated instrument blanks are unacceptable under this SOW (see page D-50/VOA, section 12.1.5.2).

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance if a contaminated instrument blank was submitted.

ACTION: Sample analysis results after the high concentration sample must be evaluated for carryover. Sample must meet the maximum carryover criteria as listed in SOM sec. 11.3.8 p. D-46/VOA.("the sample must not contain a concentration above the CRQL for the target compounds that exceeded the limit in the contaminated sample.")

		YES	NO	N/A
6.3	Do any field/trip/rinse blanks have positive hits for Low/Med VOA results (including TICs)?	✓	[ ]	___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated with a particular group of samples (may exceed one per case) must be used to qualify data. Trip blanks are used to qualify only those samples with which they were shipped. Blanks may not be qualified because of contamination in another blank.

YES NO N/

. . . .

Field blanks & trip blanks must be qualified for system monitoring compound, instrument performance criteria, spectral or calibration QC problems.

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks. If any blanks are grossly contaminated, all associated sample data should be qualified unusable (R).

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field, Trip, Storage, Instrument **	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report blank concentration for sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required
	Gross contamination	Detects	Qualify results as unusable R
	TIC > 2ug/L	Detects	See "Action" below

* 2x the CRQL for methylene chloride, 2-butanone and acetone

** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

YES NO N/A

. . . .

NOTE: Analytes qualified "U" for blank contamination are treated as "hits" when qualifying for calibration criteria.

Note: When applied as described in the table above, the contaminant concentration in the blank are multiplied by the sample dilution factor.

ACTION : For TIC compounds, if the concentration in the sample is less than five times the concentration in the most contaminated associated blank, flag the sample data "R" (unusable).

6.4 Are there field/rinse/equipment blanks associated with every sample? [✓] ___ ___

ACTION: Note in data assessment that there is no associated field/rinse/equipment blank.

Exception: samples taken from a drinking water tap do not have associated field blanks.

7.0 GC/MS Instrument Performance Check (Form V)

7.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for Bromofluorobenzene (BFB)? [✓] ___ ___

7.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? [✓] ___ ___

7.3 Did the 12-hour clock begin with either the injection of BFB, or in cases where a closing continuing calibration (CCV) was used as an opening CCV? [✓] ___ ___

Listed below are some, but not necessarily all, examples of acceptable analytical sequences incorporating the use of the opening/closing CCV. Use these examples as a guide for possible analytical sequences that can be expected.

YES NO N/A

Conditions for When Example Sequence is Appropriate:	Acceptable Criteria That Must be Met:	Notes:
If time remains on the 12 hour clock after initial calibration sequence	• BFB tunes meet instrument performance criteria. • The five initial calibration standards meet initial calibration criteria. • CCV A meets both opening and closing CCV criteria • CCV B meets closing CCV criteria.	The requirement of starting the new 12-hr clock for Analytical Sequence 2 with a new BFB tune is waived if CCV A meets opening CCV criteria. If CCV B meets opening CCV criteria, a method blank and subsequent samples may be analyzed immediately after CCV B.
If time remains on the 12 hour clock after initial calibration sequence	• BFB tunes meet instrument performance criteria. • The five initial calibration standards meet initial calibration criteria. • CCV A meets closing CCV criteria (but does not meet opening CCV criteria). • CCV B meets opening CCV criteria. • CCV C meets closing CCV Criteria.	CCV A does not meet opening criteria, therefore a new BFB tune must be performed, immediately followed by CCV B before a method blank and any samples may be analyzed. In this case, the new 12 h clock and Analytical Sequence 2 begins with the injection of the new BFB tune.
If more than 12 hrs have elapsed since the most recent initial calibration or closing CCV. OR If the most recent closing CCV was not or could not be used as an opening CCV.	• BFB tunes meet instrument performance criteria. • CCV A meets opening CCV criteria. • CCV B meets both opening and closing CCV criteria. • CCV C meets both opening and closing CCV criteria.	The requirement of starting the new 12 hour clock for Analytical Sequence 2 with a new BFB tune is waived if CCV B meets opening CCV criteria. If CCV C meets opening CCV criteria, a method blank and subsequent samples may be analyzed immediately after CCV B.

YES NO N/A

If more than 12 hrs have elapsed since the most recent initial calibration or closing CCV OR If the most recent closing CCV was not or could not be used as an opening CCV	• BFB tunes meet instrument performance criteria. • CCV A meets opening CCV criteria. • CCV B meets closing CCV criteria (but does not meet opening CCV criteria). • CCV C meets opening CCV Criteria. • CCV D meets both opening and closing CCV criteria.	CCV B does not meet opening CCV criteria, therefore a new BFB tune must be performed, immediately followed by CCV B before a method blank and any samples may be analyzed. In this case, the new 12 hr clock and Analytical Sequence 2 begins with the injection of the new BFB tune. The requirement of starting the new 12 hr clock for Analytical Sequence 3 with a new BFB tune is waived if CCV D meets opening CCV criteria. If CCV D meets opening criteria, a method blank and subsequent samples may be analyzed after CCV B.

7.4 Have the ion abundances been normalized to m/z 95 [✓] ___ ___

NOTE: All ion abundance ratios must be normalized to m/z 95, the nominal base peak, even though the ion abundance of m/z 174 may be up to 120% that of m/z 95.

ACTION: If mass assignment is in error, qualify all associated data as unusable (R).

7.5 Have the ion abundance criteria been met for each instrument used? [✓] ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, professional Judgement may be applied to determine to what extent the data may be utilized.

7.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.) ___ [✓] ___

7.7 Is the number of significant figures for the reported relative abundances consistent with the number given in the ion abundance criteria column on Form V ? [✓] ___ ___

	YES	NO	N/A

ACTION: If large errors exist, take action as specified in section 3.1 above.

		YES	NO	N/A
7.8	Is the spectrum of the mass calibration compound acceptable?	[✓]	___	___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

8.0 Target Compound List (TCL) Analytes (Form I)

8.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:

	YES	NO	N/A
a. Samples and/or fractions as appropriate?	[✓]	___	___
b. Regional Control/MS/MSD samples?	[ ]	___	✓
c. Blanks (method, trip, etc)?	[✓]	___	___

8.2 Are the VOA Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following:

	YES	NO	N/A
a. Samples and/or fractions as appropriate?	[✓]	___	___
b. Regional Control/MS/MSD samples?	[ ]	___	✓
c. Blanks (method, trip, etc)?	[✓]	___	___

ACTION: If any data are missing, take action specified in 3.1 above.

8.3 Is chromatographic performance acceptable with respect to:

	YES	NO	N/A
Baseline stability?	[✓]	___	___
Resolution?	[✓]	___	___
Peak shape?	[✓]	___	___
Full-scale graph (attenuation)?	[✓]	___	___
Other: ____________________?	[ ]	___	✓

ACTION: Use professional judgement to determine the acceptability of the data.

		YES	NO	N/A
8.4	Are lab-generated standard mass spectra of the identified VOA compounds present for each sample?	[✓]	___	___

	YES	NO	N/A

ACTION: If any mass spectra are missing, take action as specified in 3.1 above. If lab does not generate their own standard spectra, make note under the "Contract Problems/Non-Compliance" section of the Data Assessment. If spectra are unavailable reject "R" the reported results.

		YES	NO	N/A
8.5	Is the RRT of each reported compound within ± 0.06 RRT units of the standard RRT in the continuing calibration?	[/]	___	___
8.6	Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum?	[/]	___	___
8.7	Do sample and standard relative ion intensities agree to within ± 20%?	[/]	___	___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R) flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in sections 8.4-8.7 above.

ACTION: When sample carry-over is suspected, review section 6.2/Action #2 above before determining if instrument cross-contamination has affected positive compound identifications.

9.0 <u>Tentatively Identified Compounds (TIC)</u>

		YES	NO	N/A
9.1	Are all Tentatively Identified Compound Forms (Form I VOA-TIC) present? Do listed TICs include scan number or retention time, as well as the estimated "J" and/or "JN" qualifier?	[/]	___	___
9.2	Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:			
	a. Samples and/or fractions as appropriate?	[/]	___	___
	b. Blanks?	[/]	___	___
	b. Are Alkanes listed in/or part of the Case Narrative?	[/]	___	___

ACTION: If any TIC data are missing, take action specified in 3.1 above.

	YES	NO	N/A
ACTION: Verify "JN" qualifier is present for all chemically named TICs having a percent match of greater than or equal 85%. TICs labeled "unknown" are qualified with a "J" qualifier.			
9.3 Are any target compounds (from any fraction) listed as TICs? (Example: 1,2-dimethylbenzene is xylene - a VOA target analyte - and should not be reported as a TIC.)	___	[✓]	___
ACTION: Flag with "R" only target compound detected in another fraction (except blank contamination).			
9.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% also present in the sample mass spectrum?	[✓]	___	___
9.5 Do TICs and "best match" reference spectra relative ion intensities agree within ± 20%?	[✓]	___	___

ACTION: Use professional judgement to determine the acceptability of TIC identifications. If it is determined that an incorrect identification was made, change its identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate.

Action: When a compound is not found in any blank, but is detected in a sample and is a suspected artifact of a common laboratory contaminant, solvent preservatives or Aldo condensation, the result should be qualified as unusable (R). (i.e., common lab contaminants such as CO_2(m/e 44), Siloxanes (m/e 73), diethyl ether, hexane, certain freons. Aldol condensation products: 4-hydroxy-4-methyl-2-pentanone, 4-methyl-2-penten-2-one, and 5,5-dimethyl-2(H)-furanone. Solvent preservatives cyclohexene, and related by-products: cyclohexanone, cyclohexenone, cyclohexanol, cyclohexenone, chlorocyclohexene, and chlorocyclohexanol.).

10.0 Compound Quantitation and Reported Detection Limits

	YES	NO	N/A
10.1 Are there any transcription/calculation errors in Form I results? (Check at least two positive values. Verify that the correct internal standards, quantitation ions, and RRFs were used to calculate Form I results.)	✓	[ ]	___
10.2 Are the CRQLs adjusted to reflect sample dilutions and per cent moisture?	[ ]	✓	___

ACTION: If errors are large, take action as specified in section 3.1 above.

Med level CRQL incr.

TOPO contact for resub

2/16

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the

	YES	NO	N/A

higher CRQLs data from the diluted sample). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and its corresponding value on the original Form I and substituting the data from the diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's not to be used, including any in the data summary package.

10.3 For non-aqueous samples, were the percent moisture < 70%? [✓] ___ ___

Action: If the % moisture ≥ 70.0% and < 90.0%, qualify detects as "J" and non-detects as approximated "UJ" If the % Moisture ≥ 90%, qualify detects as "J" and non-detects as "R"

11.0 Standards Data (GC/MS)

11.1 Are the reconstructed ion chromatograms, and data system printouts (quant. reports) present for each initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.1 above.

12.0 GC/MS Initial Calibration (Form VI)

12.1 Are the Initial Calibration Forms (Form VI LCV) present and complete for the volatile fraction at concentrations of 5, 10, 50, 100, and 200 µg/ℓ for non-ketones, 10, 20, 100, 200 and 400 ug/L for ketones and 100, 200, 1250, 2000, and 4000 ug/L for 1,4-dioxane. [✓] ___ ___

ACTION: If any Initial Calibration forms are missing, take action as specified in section 3.1 above.

12.2 Are the relative standard deviation (RSD) stable for VOA's over the concentration range of the calibration (i.e., %RSD ≤ 20.%, ≤ 40% for poor performers (see table below), ≤ 50% for 1,4-dioxane)? [ ] ✓ ___

ACTION: Circle all outliers in red.

NOTE: The twenty two (22) poor performers compounds and associated DMCs are listed below. The relative response factor (RRF) for these compounds must be greater than or equal to 0.010.

YES NO N/A

. . . .

Volatile Compounds Exhibiting Poor Response

Volatile Compounds	
Acetone	1,2-Dibromo-3-chloropropane
2-Butanone	Isopropylbenzene
Carbon disulfide	Methyl acetate
Chloroethane	Methylene chloride
Chloromethane	Methylcyclohexane
Cyclohexane	Methyl tert-butyl ether
1,4-Dioxane	trans-1,2-Dichloroethene
1,2-Dibromoethane	4-Methyl-2-pentanone
Dichlorodifluoromethane	2-Hexanone
cis-1,2-dichloroethene	Trichlorofluoromethane
1,2-Dichloropropane	1,1,2-Trichloro-1,2,2-trifluoroethane

ACTION: If %RSD > 20.0%, (> 40.0% for the poor performers, and > 50% for 1,4-dioxane), qualify associated positive results for that analyte "J" (estimated). If %RSD is > 90, flag all non-detects for that analyte "R" (unusable) and positive results "J".

NOTE: Analytes previously qualified "U" for blank contamination are still treated as "hits" when qualifying for initial calibration criteria.

12.3 Are any $\overline{RRF}$s < 0.050 (< 0.010 for poor performers)? ✓ [ ] ___

ACTION: Circle all outliers in red.

ACTION: If any $\overline{RRF}$ values are < 0.05 or < 0.01 for poor performers, qualify associated non-detects unusable (R) and associated positive results estimated (J).

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance the analytes that fail %RSD and/or RRF criteria.

12.4 Are there any transcription/calculation errors in

	YES	NO	N/A
the reporting of RRFs, RRFs or %RSD values? (Check at least 2 values, but if errors are found, check more.)	___	[ ]	___

ACTION: Circle errors in red.

ACTION: If errors are large, contact the TOPO to obtain an explanation/resubmittal from the lab, document in the Data Assessment under Contract Problems/Non-Compliance.

13.0 GC/MS Continuing Calibration Verification (CCV) (Form VII)

	YES	NO	N/A
13.1 Are the Continuing Calibration Forms (Form VII) present and complete for the volatile fraction?	[✓]	___	___
13.2 Did the 12 hour clock begin with either the injection of BFB or in cases where a closing CCV can be used as an opening CCV for each instrument?	[✓]	___	___

ACTION: If any forms are missing or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, ask the TOPO to obtain explanation/resubmittal from the laboratory. If continuing calibration data are unavailable, flag all associated sample data as unusable (R).

	YES	NO	N/A
13.3 Do any volatile compounds have a % Difference (% D) between the initial RRF and CCV RRF exceeding ± 50% for 1,4-Dioxane, ± 40% for the poor performers or ± 25% for the remaining compounds?	✓	[ ]	___

ACTION: Circle all outliers in red.

	YES	NO	N/A
13.4 Do any volatile compounds have a RRF < 0.05 or < 0.01 for the poor performers?	✓	[ ]	___

ACTION: Circle all outliers in red.

Note: Verify that the CCV was run at the required frequency (an opening and closing CCV must be run within 12-hour period) and the CCV was compared to the correct initial calibration. If the mid-point standard from the initial calibration is used as an opening CCV, verify that the result (RRF) of the mid-point standard was compared to the average RRF from the correct initial calibration.

Note: The closing CCV used to bracket the end of a 12-hour analytical sequence may be used as the opening CCV for the new 12-hour analyical sequence, provided that all the technical acceptance criteria are met for an opening CCV (see table below). If the closing CCV does not meet the technical acceptance criteria for an opening CCV, then a BFB tune followed by an opening CCV is required and the next 12-hour time period begins with the BFB tune.

Action: Use the following table to qualify data based on the technical acceptance criteria for the opening CCV and closing CCV.

. . . .

Continuing Calibration Verification (CCV) Actions for Low/Medium Volatiles Analyses

Criteria for Opening CCV	Criteria for Closing CCV	Action	
		Detected Associated Compounds	Non-Detected Associated Compounds
RRF < 0.010 (poor responders) RRF < 0.050 (all other volatile target compounds)	RRF < 0.010 (for all volatile target compounds)	J	R
RRF ≥ 0.010 (poor responders) RRF ≥ 0.050 (for all other compounds)	RRF ≥ 0.010 (for all target volatile compounds)	No Action	
%D > 50.0 or < -50.0 (1,4-Dioxane) %D > 40.0 or < -40.0 (poor responders) %D > 25.0 or < -25.0 (all other volatile target compounds)	%D > 50.0 or < -50.0 (for all volatile target compounds)	J	UJ
%D ≤ 50.0 or ≥ -50.0 (1,4-Dioxane) %D ≤ 40.0 or ≥ -40.0 (poor responders) %D ≤ 25.0 or ≥ -25.0 (all other volatile target compounds)	%D ≤ 50.0 or ≥ -50.0 (for all volatile target compounds)	No Action	
Opening CCV not performed at required frequency *	Closing CCV not performed at required frequency *	R	

* See section 13.2 above

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance if more than two of the required analytes failed the above acceptance criteria.

13.5 Are there any transcription/calculation errors for the reporting of RRFs, or %D between initial RRFs and continuing RRFs? (Check at least two values but if errors are found, check more.) ___ [✓] ___

ACTION: Circle errors with red pencil.

ACTION: If errors are large, notify the TOPO to obtain explanation/resubmittals from the lab. Document errors in the Contract Problems/Non-Compliance section of the Data Assessment.

YES NO N/A

Note: All DMCs must meet RRF ≥ 0.010. No qualification of the data is necessary on the DMCs RRF and %RSD/%Diff data alone. However, use professional judgment to evaluate the DMC and %RSD/% Diff data in conjunction with the DMC recoveries to determine the need of qualification of the data.

14.0 Internal Standard (Form VIII)

14.1 Were the internal standard area counts for every sample and blank within the range of 50.0% and 200.0% of its response in the most recent opening CCV standard calibration? [✓] ___ ___

If no, were affected sample reanalyzed? [ ] ✓ ___

ACTION: 1. Circle all outliers with red pencil.

B3RY1

14.2 Are the retention times of the internal standards in sample or blanks within ±30 seconds from the RT of the internal standard in the 12-hour associated calibration standard (opening CCV or mid-point standard from initial calibration)? [✓] ___ ___

Action: Use the following table to qualify the data:

INTERNAL STANDARDS ACTIONS FOR LOW/MEDIUM VOLATILES

Criteria	ACTION	
	Detected Associated Compounds *	Non-detected Associated Compounds *
Area counts ≥ 50% and ≤ 200% of 12-hour standard (opening CCV or mid-point standard from initial calibration)	No Action	
Area counts < 50% of 12-hour standard (opening CCV or mid-point standard from initial calibration)	J	R
Area counts > 200% of 12-hour standard (Opening CCV or mid-point standard from initial calibration)	J	No Action
RT difference > 30.0 seconds between samples and 12-hour standard (Opening CCV or mid-point standard from initial calibration)	R**	R
RT difference ≤ 30.0 seconds between samples and 12-hour standard (Opening CCV or mid-point standard from initial calibration)	No Action	

* For volatile compounds associated to each internal standard, see Table 3-Low/Medium Volatile Target Compounds and Deuterated Monitoring Compounds with Corresponding Internal Standards for Quantitation in SOM01.1, Exhibit D, available at:

. . . .

Http://www.epa.gov/superfund/programs/clp/som1.htm

** Examine the chromatographic profile for that sample to determine if any false positives or negatives exist. For shifts of a large magnitude, the reviewer may consider partial or total rejection of the data for that sample fraction. Detects should not need to be qualified as unusable "R" if the mass spectral are met.

NOTE: Contract Requirements: The SOM (section 11.4.1 page D-46/VOA Low/Medium states that any sample which fails the acceptance criteria for IS response must be reanalyzed.

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance any sample(s) which failed the above IS acceptance criteria.

15.0 Field Duplicates

15.1 Were any field duplicates submitted for Low Concentration VOA analysis? [✓] ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between duplicate results must be addressed in the reviewer narrative. If large differences exist, contact the TOPO to confirm identification of field duplicates with the sampler.

RECEIVED
FEB 01 2007
HAZ. WASTE SUPPORT SEC.

SDG Narrative

Mitkem Corporation submits the enclosed data package in response to USEPA Case # 36113 and SDG# B3RS5. Analyses were performed for twenty soil samples that were received on January 23 and 24, 2007. The analyses were performed under USEPA Contract # EP-W-05-030. Please note that the sample-shipping cooler received on January 23 was measured at 3°C and the cooler received on January 24 was measured at 1°C.

No sample tags were received with the samples. Per the Region, proceed with analysis of the samples.

The following samples are submitted in this data package:

Client ID	Lab ID	Analysis
B3RS5	F0075-01B	V
B3RS5ME	F0075-01C	V
B3RS6	F0075-02B	V
B3RS6ME	F0075-02C	V
B3RT4	F0075-03B	V
B3RT5	F0075-04B	V
B3RT5ME	F0075-04C	V
B3RT7	F0075-05B	V
B3RT7RE	F0075-05BRA	V
B3RT8	F0075-06B	V
B3RX9	F0075-07B	V
B3RY0	F0075-08B	V
B3RY1	F0075-09B	V
B3RR4	F0075-10B	V
B3RR5	F0075-11B	V
B3RR5ME	F0075-11C	V
B3RR7	F0075-12B	V
B3RR7ME	F0075-12C	V
B3RR8	F0075-13B	V
B3RR8ME	F0075-13C	V
B3RR9	F0075-14B	V
B3RR9ME	F0075-14C	V
B3RS2	F0075-15B	V
B3RS3	F0075-16B	V
B3RS8	F0075-17B	V
B3RS9	F0075-18B	V
B3RT1	F0075-19B	V
B3RT1RE	F0075-19BRA	V
B3RT2	F0075-20B	V

194

V = Volatiles

The analyses were performed using USEPA CLP Multi-Media, Multi-Concentration (SOM01.1) protocols. The analyses were performed with strict adherence to the SOW with the following exceptions and observations:

1. Overall Observation:

Where needed, manual integrations were performed to improve data quality. The corrections were reviewed and associated hardcopies generated and reported as required. Manual integrations are coded to provide the data reviewer justification for such action. The codes are labeled on the ion chromatogram signal (GC/MS signal) and chromatogram for GC based analysis as follows:

- M1 peak tailing or fronting.
- M2 peak co-elution.
- M3 rising or falling baseline.
- M4 retention time shift.
- M5 miscellaneous – under this category, the justification is explained.

2. Volatile Analysis:

Trap used for instruments V2 and V5: OI Analytical #10 trap containing 8 cm each of Tenax, silica gel and carbon molecular sieve.

GC column used: 30 m x 0.25 mm id (1.4 um film thickness) DB-624 capillary column.

cis-1,3-Dichloropropene-d4 was detected in method blanks and in samples. The volatile organic deuterated monitoring compound spike solution contains both the cis- and trans-1,3-dichloropropene isomers. cis-1,3-Dichloropropene-d4 is not a dueterated monitoring compound for SOM01.1, while the trans isomer is. The cis isomer is considered a laboratory artifact, and is not reported as a tentatively identified compound.

The following equation was used to calculate the concentration of target analytes for soil samples:

$$\text{Concentration } (\mu g/Kg) = \frac{(Amt)(DF)(UF)(5)}{\left(\frac{Ws * (100 - M)}{100}\right)}$$

200

where: Amt = CAL – AMT on raw data
DF = Dilution factor
UF = ng unit correction factor
Ws = Weight of sample extracted (g)
M = %moisture (not decanted)

The soil samples were received in Encore samplers. The samples were extruded into unpreserved VOA vials and kept frozen until time of analysis.

Alkanes were determined as part of tentatively identified compounds. The alkanes are reported on the Alkane Narrative Report following the SDG narrative.

DMC recoveries were within the QC limits with the exception of high recovery of 1,4-dioxane-d8 in samples B3RT4, B3RX9 and B3RY0 and holding blank VHBLK5N, high recovery of 1,2-dichloropropane-d6 and 1,4-dioxane-d8 in sample B3RY1, high recovery of benzene-d6, 1,2-dichloropropane-d6 and 1,4-dioxane-d8 in sample B3RY0, high recovery of benzene-d6, 1,2-dichloropropane-d6, toluene-d8 and trans-1,3-dichloropropene-d4 in sample B3RT7 and high recovery of vinyl chloride-d3, chloroethane-d5, benzene-d6, 1,2-dichloropropane-d6 and toluene-d8 and low recovery of 2-butanone-d5 in sample B3RT1. Matrix interference confirmed on DMC recoveries for samples B3RT7 and B3RT1, as the samples were re-analyzed with similar findings.

No manual integrations were performed.

For 1,4-dioxane and 1,4-dioxane-d8, the laboratory was unable to achieve the minimum average RRF of 0.0050 for both the initial calibration as well as the opening and closing calibration verifications. In our experience, this compound will not reliably achieve the SOM method performance criteria due to its high water solubility. Please note that a better approach is to analyze this as an extractable semivolatile organic compound.

Internal standard area counts were within QC criteria with the exception of samples B3RT1, B3RT7 and B3RY1. Matrix interference confirmed on internal standard area counts for sample B3RT1 and B3RT7 were re-analyzed with similar findings. Due to laboratory oversight, sample B3RY1 was not re-analyzed for internal standard area counts.

To ensure that all target analyte responses were within the response of the high standard, the following samples were re-analyzed by the medium-level approach: B3RT5, B3RR5, B3RR7, B3RR8, B3RR9, B3RS5 and B3RS6.

No other unusual observation was made for the analysis.

All of the submittals to the region are originals other than logbook pages. Photocopies of logbook pages are included, with the originals maintained on file at the laboratory. Tunes, calibration verifications and initial calibrations that are shared among several cases are photocopies indicating the location of the originals.

I certify that this Sample Data Package is in compliance with the terms and condition of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy Sample Data Package and in the electronic data deliverable has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Agnes Ng
CLP Project Manager
01/30/07

202

ALKANE NARRATIVE REPORT
Report Date: 01/30/2007
SDG: B3RS5

Client Sample ID: B3RT7RE   Lab Sample ID: F0075-05BRA   File ID: V5H4870.D

Compound	RT	Est. Conc.	Q
Straight-chain Alkane	9.453	490	J

203

RECEIVED
FEB 01 2007
HAZ. WASTE SUPPORT SEC.

Contract Laboratory Program

Sample Delivery Group (SDG)
Cover Sheet

SDG Number B3RS5

Laboratory Name	Mitkem Coroporation	Lab Code	MITKEM
Contract No.	36113	Case No.	36113
Analysis Price	$ 0.00	SDG Turnaround	7 days

EPA Sample Numbers in SDG (Listed in Numerical Order)

01) B3RR4	08) B3RS5	15) B3RT5	
02) B3RR5	09) B3RS6	16) B3RT7	
03) B3RR7	10) B3RS8	17) B3RT8	
04) B3RR8	11) B3RS9	18) B3RX9	
05) B3RR9	12) B3RT1	19) B3RY0	
06) B3RS2	13) B3RT2	20) B3RY1	
07) B3RS3	14) B3RT4		

First Sample in SDG: B3RS5

Last Sample in SDG: B3RT2

First Sample Receipt Date: 01/23/2007

Last Sample Receipt Date: 01/24/2007

Note: There are a maximum of 20 field samples [excluding Performance Evaluation (PE) samples in an SDG. Attach the TR/COC Records to this form in alphanumeric order (the order listed above on this form).

Signature AgnesRNg Date 01/25/2007

204

S01

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR4

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-10B

Sample wt/vol: 4.20 (g/mL) G   Lab File ID: V5H4887.D

Level: (TRACE/LOW/MED) LOW   Date Received: 01/24/2007

% Moisture: not dec. 26   Date Analyzed: 01/25/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	8.0	U
74-87-3	Chloromethane	8.0	U
75-01-4	Vinyl chloride	8.0	U
74-83-9	Bromomethane	8.0	U
75-00-3	Chloroethane	8.0	U
75-69-4	Trichlorofluoromethane	8.0	U
75-35-4	1,1-Dichloroethene	8.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	8.0	U
67-64-1	Acetone	16	U
75-15-0	Carbon disulfide	8.0	U
79-20-9	Methyl acetate	8.0	U
75-09-2	Methylene chloride	8.0	U
156-60-5	trans-1,2-Dichloroethene	8.0	U
1634-04-4	Methyl tert-butyl ether	8.0	U
75-34-3	1,1-Dichloroethane	8.0	U
156-59-2	cis-1,2-Dichloroethene	8.0	U
78-93-3	2-Butanone	16	U
74-97-5	Bromochloromethane	8.0	U
67-66-3	Chloroform	8.0	U
71-55-6	1,1,1-Trichloroethane	8.0	U
110-82-7	Cyclohexane	8.0	U
56-23-5	Carbon tetrachloride	8.0	U
71-43-2	Benzene	8.0	U
107-06-2	1,2-Dichloroethane	8.0	U
123-91-1	1,4-Dioxane	160	~~U~~ R

205

501

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR4

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0075-10B

Sample wt/vol: 4.20 (g/mL) G Lab File ID: V5H4887.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/24/2007

% Moisture: not dec. 26 Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	8.0	U
108-87-2	Methylcyclohexane	8.0	U
78-87-5	1,2-Dichloropropane	8.0	U
75-27-4	Bromodichloromethane	8.0	U
10061-01-5	cis-1,3-Dichloropropene	8.0	U
108-10-1	4-Methyl-2-pentanone	16	U
108-88-3	Toluene	8.0	U
10061-02-6	trans-1,3-Dichloropropene	8.0	U
79-00-5	1,1,2-Trichloroethane	8.0	U
127-18-4	Tetrachloroethene	8.0	U
591-78-6	2-Hexanone	16	U
124-48-1	Dibromochloromethane	8.0	U
106-93-4	1,2-Dibromoethane	8.0	U
108-90-7	Chlorobenzene	8.0	U
100-41-4	Ethylbenzene	8.0	U
179601-23-1	m,p-Xylene	8.0	U
95-47-6	o-Xylene	8.0	U
100-42-5	Styrene	8.0	U
75-25-2	Bromoform	8.0	U
98-82-8	Isopropylbenzene	8.0	U
79-34-5	1,1,2,2-Tetrachloroethane	8.0	U
541-73-1	1,3-Dichlorobenzene	8.0	U
106-46-7	1,4-Dichlorobenzene	8.0	U
95-50-1	1,2-Dichlorobenzene	8.0	U
96-12-8	1,2-Dibromo-3-chloropropane	8.0	U
120-82-1	1,2,4-Trichlorobenzene	8.0	U
87-61-6	1,2,3-Trichlorobenzene	8.0	U

206

501

EPA SAMPLE NO.

B3RR4

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-10B

Sample wt/vol: 4.20 (g/mL) G   Lab File ID: V5H4887.D

Level: (TRACE or LOW/MED) LOW   Date Received: 01/24/2007

% Moisture: not dec. 26   Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG   Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796 [1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

207

5501

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR5

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0075-11B

Sample wt/vol: 5.20 (g/mL) G Lab File ID: V5H4888.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/24/2007

% Moisture: not dec. 34 Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	7.3	U
74-87-3	Chloromethane	7.3	U
75-01-4	Vinyl chloride	7.3	U
74-83-9	Bromomethane	7.3	U
75-00-3	Chloroethane	7.3	U
75-69-4	Trichlorofluoromethane	7.3	U
75-35-4	1,1-Dichloroethene	1.7	J
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	7.3	U
67-64-1	Acetone	15	U
75-15-0	Carbon disulfide	7.3	U
79-20-9	Methyl acetate	7.3	U
75-09-2	Methylene chloride	7.3	U
156-60-5	trans-1,2-Dichloroethene	7.3	U
1634-04-4	Methyl tert-butyl ether	7.3	U
75-34-3	1,1-Dichloroethane	7.3	U
156-59-2	cis-1,2-Dichloroethene	7.3	U
78-93-3	2-Butanone	15	U
74-97-5	Bromochloromethane	7.3	U
67-66-3	Chloroform	7.3	U
71-55-6	1,1,1-Trichloroethane	7.3	U
110-82-7	Cyclohexane	7.3	U
56-23-5	Carbon tetrachloride	7.3	U
71-43-2	Benzene	7.3	U
107-06-2	1,2-Dichloroethane	7.3	U
123-91-1	1,4-Dioxane	150	~~U~~ R

208

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR5

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-11B

Sample wt/vol: 5.20 (g/mL) G   Lab File ID: V5H4888.D

Level: (TRACE/LOW/MED) LOW   Date Received: 01/24/2007

% Moisture: not dec. 34   Date Analyzed: 01/25/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	7.3	U
108-87-2	Methylcyclohexane	7.3	U
78-87-5	1,2-Dichloropropane	7.3	U
75-27-4	Bromodichloromethane	7.3	U
10061-01-5	cis-1,3-Dichloropropene	7.3	U
108-10-1	4-Methyl-2-pentanone	15	U
108-88-3	Toluene	7.3	U
061-02-6	trans-1,3-Dichloropropene	7.3	U
79-00-5	1,1,2-Trichloroethane	7.3	U
127-18-4	Tetrachloroethene	2000 * ~~720~~	~~E~~
591-78-6	2-Hexanone	15	U
124-48-1	Dibromochloromethane	7.3	U
106-93-4	1,2-Dibromoethane	7.3	U
108-90-7	Chlorobenzene	7.3	U
100-41-4	Ethylbenzene	7.3	U
179601-23-1	m,p-Xylene	7.3	U
95-47-6	o-Xylene	7.3	U
100-42-5	Styrene	7.3	U
75-25-2	Bromoform	7.3	U
98-82-8	Isopropylbenzene	7.3	U
79-34-5	1,1,2,2-Tetrachloroethane	7.3	U
541-73-1	1,3-Dichlorobenzene	7.3	U
106-46-7	1,4-Dichlorobenzene	7.3	U
95-50-1	1,2-Dichlorobenzene	7.3	U
96-12-8	1,2-Dibromo-3-chloropropane	7.3	U
120-82-1	1,2,4-Trichlorobenzene	7.3	U
87-61-6	1,2,3-Trichlorobenzene	7.3	U

* Transferred from B3RR5ME

5501

EPA SAMPLE NO.

B3RR5

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0075-11B

Sample wt/vol: 5.20 (g/mL) G Lab File ID: V5H4888.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/24/2007

% Moisture: not dec. 34 Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

210

502

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR7

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-12B

Sample wt/vol: 5.70 (g/mL) G   Lab File ID: V5H4889.D

Level: (TRACE/LOW/MED) LOW   Date Received: 01/24/2007

% Moisture: not dec. 26   Date Analyzed: 01/25/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	5.9	U
74-87-3	Chloromethane	5.9	U
75-01-4	Vinyl chloride	5.9	U
74-83-9	Bromomethane	5.9	U
75-00-3	Chloroethane	5.9	U
75-69-4	Trichlorofluoromethane	5.9	U
75-35-4	1,1-Dichloroethene	5.9	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.9	U
67-64-1	Acetone	12	U
75-15-0	Carbon disulfide	5.9	U
79-20-9	Methyl acetate	5.9	U
75-09-2	Methylene chloride	5.9	U
156-60-5	trans-1,2-Dichloroethene	5.9	U
1634-04-4	Methyl tert-butyl ether	5.9	U
75-34-3	1,1-Dichloroethane	5.9	U
156-59-2	cis-1,2-Dichloroethene	33	
78-93-3	2-Butanone	12	U
74-97-5	Bromochloromethane	5.9	U
67-66-3	Chloroform	5.9	U
71-55-6	1,1,1-Trichloroethane	5.9	U
110-82-7	Cyclohexane	5.9	U
56-23-5	Carbon tetrachloride	5.9	U
71-43-2	Benzene	5.9	U
107-06-2	1,2-Dichloroethane	5.9	U
123-91-1	1,4-Dioxane	120	~~U~~ R

211

S02

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR7

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-12B

Sample wt/vol: 5.70 (g/mL) G   Lab File ID: V5H4889.D

Level: (TRACE/LOW/MED) LOW   Date Received: 01/24/2007

% Moisture: not dec. 26   Date Analyzed: 01/25/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	970 * ~~570~~	~~E~~
108-87-2	Methylcyclohexane	5.9	U
78-87-5	1,2-Dichloropropane	5.9	U
75-27-4	Bromodichloromethane	5.9	U
10061-01-5	cis-1,3-Dichloropropene	5.9	U
108-10-1	4-Methyl-2-pentanone	12	U
108-88-3	Toluene	5.9	U
10061-02-6	trans-1,3-Dichloropropene	5.9	U
79-00-5	1,1,2-Trichloroethane	5.9	U
127-18-4	Tetrachloroethene	170	
591-78-6	2-Hexanone	12	U
124-48-1	Dibromochloromethane	5.9	U
106-93-4	1,2-Dibromoethane	5.9	U
108-90-7	Chlorobenzene	5.9	U
100-41-4	Ethylbenzene	5.9	U
179601-23-1	m,p-Xylene	5.9	U
95-47-6	o-Xylene	5.9	U
100-42-5	Styrene	5.9	U
75-25-2	Bromoform	5.9	U
98-82-8	Isopropylbenzene	5.9	U
79-34-5	1,1,2,2-Tetrachloroethane	5.9	U
541-73-1	1,3-Dichlorobenzene	5.9	U
106-46-7	1,4-Dichlorobenzene	5.9	U
95-50-1	1,2-Dichlorobenzene	5.9	U
96-12-8	1,2-Dibromo-3-chloropropane	5.9	U
120-82-1	1,2,4-Trichlorobenzene	5.9	U
87-61-6	1,2,3-Trichlorobenzene	5.9	U

* Transferred from B3RR7ME

212

502

EPA SAMPLE NO.

B3RR7

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-12B

Sample wt/vol: 5.70 (g/mL) G   Lab File ID: V5H4889.D

Level: (TRACE or LOW/MED) LOW   Date Received: 01/24/2007

% Moisture: not dec. 26   Date Analyzed: 01/25/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: ______ (uL)   Soil Aliquot Volume: ______ (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG   Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

213

5502

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR8

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-13B

Sample wt/vol: 5.30 (g/mL) G   Lab File ID: V5H4890.D

Level: (TRACE/LOW/MED) LOW   Date Received: 01/24/2007

% Moisture: not dec. 28   Date Analyzed: 01/25/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6.6	U
74-87-3	Chloromethane	6.6	U
75-01-4	Vinyl chloride	400	~~E~~ J
74-83-9	Bromomethane	6.6	U
75-00-3	Chloroethane	6.6	U
75-69-4	Trichlorofluoromethane	6.6	U
75-35-4	1,1-Dichloroethene	5.8	J
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	6.6	U
67-64-1	Acetone	13	U
75-15-0	Carbon disulfide	6.6	U
79-20-9	Methyl acetate	6.6	U
75-09-2	Methylene chloride	6.6	U
156-60-5	trans-1,2-Dichloroethene	28	
1634-04-4	Methyl tert-butyl ether	6.6	U
75-34-3	1,1-Dichloroethane	6.6	U
156-59-2	cis-1,2-Dichloroethene	1400	~~E~~ J
78-93-3	2-Butanone	13	U
74-97-5	Bromochloromethane	6.6	U
67-66-3	Chloroform	6.6	U
71-55-6	1,1,1-Trichloroethane	6.6	U
110-82-7	Cyclohexane	6.6	U
56-23-5	Carbon tetrachloride	6.6	U
71-43-2	Benzene	6.6	U
107-06-2	1,2-Dichloroethane	6.6	U
123-91-1	1,4-Dioxane	130	~~J~~ R

214

5502

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR8

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-13B

Sample wt/vol: 5.30 (g/mL) G   Lab File ID: V5H4890.D

Level: (TRACE/LOW/MED) LOW   Date Received: 01/24/2007

% Moisture: not dec. 28   Date Analyzed: 01/25/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	1300* ~~1000~~	~~E~~
108-87-2	Methylcyclohexane	6.6	U
78-87-5	1,2-Dichloropropane	6.6	U
75-27-4	Bromodichloromethane	6.6	U
10061-01-5	cis-1,3-Dichloropropene	6.6	U
108-10-1	4-Methyl-2-pentanone	13	U
108-88-3	Toluene	6.6	U
10061-02-6	trans-1,3-Dichloropropene	6.6	U
79-00-5	1,1,2-Trichloroethane	6.6	U
127-18-4	Tetrachloroethene	610* ~~390~~	~~E~~
591-78-6	2-Hexanone	13	U
124-48-1	Dibromochloromethane	6.6	U
106-93-4	1,2-Dibromoethane	6.6	U
108-90-7	Chlorobenzene	6.6	U
100-41-4	Ethylbenzene	6.6	U
179601-23-1	m,p-Xylene	6.6	U
95-47-6	o-Xylene	6.6	U
100-42-5	Styrene	6.6	U
75-25-2	Bromoform	6.6	U
98-82-8	Isopropylbenzene	6.6	U
79-34-5	1,1,2,2-Tetrachloroethane	6.6	U
541-73-1	1,3-Dichlorobenzene	6.6	U
106-46-7	1,4-Dichlorobenzene	6.6	U
95-50-1	1,2-Dichlorobenzene	6.6	U
96-12-8	1,2-Dibromo-3-chloropropane	6.6	U
120-82-1	1,2,4-Trichlorobenzene	6.6	U
87-61-6	1,2,3-Trichlorobenzene	6.6	U

* Transferred from B3RR8ME

5502

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3RR8

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-13B

Sample wt/vol: 5.30 (g/mL) G   Lab File ID: V5H4890.D

Level: (TRACE or LOW/MED) LOW   Date Received: 01/24/2007

% Moisture: not dec. 28   Date Analyzed: 01/25/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG   Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

216

S502A

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR9

Lab Name: MITKEM CORPORATION — Contract: EP-W-05-030

Lab Code: MITKEM — Case No.: 36113 — Mod. Ref No.: — SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL — Lab Sample ID: F0075-14B

Sample wt/vol: 5.20 (g/mL) G — Lab File ID: V5H4891.D

Level: (TRACE/LOW/MED) LOW — Date Received: 01/24/2007

% Moisture: not dec. 26 — Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm) — Dilution Factor: 1.0

Soil Extract Volume: (uL) — Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6.5	U
74-87-3	Chloromethane	6.5	U
75-01-4	Vinyl chloride	900 * ~~440~~	~~D~~
74-83-9	Bromomethane	6.5	U
75-00-3	Chloroethane	6.5	U
75-69-4	Trichlorofluoromethane	6.5	U
75-35-4	1,1-Dichloroethene	5.2	J
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	6.5	U
67-64-1	Acetone	13	U
75-15-0	Carbon disulfide	6.5	U
79-20-9	Methyl acetate	6.5	U
75-09-2	Methylene chloride	6.5	U
156-60-5	trans-1,2-Dichloroethene	27	
1634-04-4	Methyl tert-butyl ether	6.5	U
75-34-3	1,1-Dichloroethane	6.5	U
156-59-2	cis-1,2-Dichloroethene	5000 * ~~1400~~	~~D~~
78-93-3	2-Butanone	13	U
74-97-5	Bromochloromethane	6.5	U
67-66-3	Chloroform	6.5	U
71-55-6	1,1,1-Trichloroethane	6.5	U
110-82-7	Cyclohexane	6.5	U
56-23-5	Carbon tetrachloride	6.5	U
71-43-2	Benzene	6.5	U
107-06-2	1,2-Dichloroethane	6.5	U
123-91-1	1,4-Dioxane	130	~~U~~ R

* Transferred from B3RR9ME

217

55024

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RR9

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-14B

Sample wt/vol: 5.20 (g/mL) G   Lab File ID: V5H4891.D

Level: (TRACE/LOW/MED) LOW   Date Received: 01/24/2007

% Moisture: not dec. 26   Date Analyzed: 01/25/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	3300 * ~~890~~	~~E~~
108-87-2	Methylcyclohexane	6.5	U
78-87-5	1,2-Dichloropropane	6.5	U
75-27-4	Bromodichloromethane	6.5	U
10061-01-5	cis-1,3-Dichloropropene	6.5	U
108-10-1	4-Methyl-2-pentanone	13	U
108-88-3	Toluene	6.5	U
10061-02-6	trans-1,3-Dichloropropene	6.5	U
79-00-5	1,1,2-Trichloroethane	6.5	U
127-18-4	Tetrachloroethene	1100 * ~~200~~	~~E~~
591-78-6	2-Hexanone	13	U
124-48-1	Dibromochloromethane	6.5	U
106-93-4	1,2-Dibromoethane	6.5	U
108-90-7	Chlorobenzene	6.5	U
100-41-4	Ethylbenzene	6.5	U
179601-23-1	m,p-Xylene	6.5	U
95-47-6	o-Xylene	6.5	U
100-42-5	Styrene	6.5	U
75-25-2	Bromoform	6.5	U
98-82-8	Isopropylbenzene	6.5	U
79-34-5	1,1,2,2-Tetrachloroethane	6.5	U
541-73-1	1,3-Dichlorobenzene	6.5	U
106-46-7	1,4-Dichlorobenzene	6.5	U
95-50-1	1,2-Dichlorobenzene	6.5	U
96-12-8	1,2-Dibromo-3-chloropropane	6.5	U
120-82-1	1,2,4-Trichlorobenzene	6.5	U
87-61-6	1,2,3-Trichlorobenzene	6.5	U

* Transferred from B3RR9ME

218

SS02A

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RR9

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-14B

Sample wt/vol: 5.20 (g/mL) G   Lab File ID: V5H4891.D

Level: (TRACE or LOW/MED) LOW   Date Received: 01/24/2007

% Moisture: not dec. 26   Date Analyzed: 01/25/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG   Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

21a

503

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RS2

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0075-15B

Sample wt/vol: 4.60 (g/mL) G Lab File ID: V5H4892.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/24/2007

% Moisture: not dec. 15 Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6.4	U
74-87-3	Chloromethane	6.4	U
75-01-4	Vinyl chloride	6.4	U
74-83-9	Bromomethane	6.4	U
75-00-3	Chloroethane	6.4	U
75-69-4	Trichlorofluoromethane	6.4	U
75-35-4	1,1-Dichloroethene	6.4	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	6.4	U
67-64-1	Acetone	13	U
75-15-0	Carbon disulfide	6.4	U
79-20-9	Methyl acetate	6.4	U
75-09-2	Methylene chloride	6.4	U
156-60-5	trans-1,2-Dichloroethene	6.4	U
1634-04-4	Methyl tert-butyl ether	6.4	U
75-34-3	1,1-Dichloroethane	6.4	U
156-59-2	cis-1,2-Dichloroethene	6.4	U
78-93-3	2-Butanone	13	U
74-97-5	Bromochloromethane	6.4	U
67-66-3	Chloroform	6.4	U
71-55-6	1,1,1-Trichloroethane	6.4	U
110-82-7	Cyclohexane	6.4	U
56-23-5	Carbon tetrachloride	6.4	U
71-43-2	Benzene	6.4	U
107-06-2	1,2-Dichloroethane	6.4	U
123-91-1	1,4-Dioxane	130	~~U~~ R

220

503

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RS2

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0075-15B

Sample wt/vol: 4.60 (g/mL) G Lab File ID: V5H4892.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/24/2007

% Moisture: not dec. 15 Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	1.9	J
108-87-2	Methylcyclohexane	6.4	U
78-87-5	1,2-Dichloropropane	6.4	U
75-27-4	Bromodichloromethane	6.4	U
10061-01-5	cis-1,3-Dichloropropene	6.4	U
108-10-1	4-Methyl-2-pentanone	13	U
108-88-3	Toluene	6.4	U
10061-02-6	trans-1,3-Dichloropropene	6.4	U
79-00-5	1,1,2-Trichloroethane	6.4	U
127-18-4	Tetrachloroethene	6.4	U
591-78-6	2-Hexanone	13	U
124-48-1	Dibromochloromethane	6.4	U
106-93-4	1,2-Dibromoethane	6.4	U
108-90-7	Chlorobenzene	6.4	U
100-41-4	Ethylbenzene	6.4	U
179601-23-1	m,p-Xylene	6.4	U
95-47-6	o-Xylene	6.4	U
100-42-5	Styrene	6.4	U
75-25-2	Bromoform	6.4	U
98-82-8	Isopropylbenzene	6.4	U
79-34-5	1,1,2,2-Tetrachloroethane	6.4	U
541-73-1	1,3-Dichlorobenzene	6.4	U
106-46-7	1,4-Dichlorobenzene	6.4	U
95-50-1	1,2-Dichlorobenzene	6.4	U
96-12-8	1,2-Dibromo-3-chloropropane	6.4	U
120-82-1	1,2,4-Trichlorobenzene	6.4	U
87-61-6	1,2,3-Trichlorobenzene	6.4	U

221

503

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RS2

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0075-15B

Sample wt/vol: 4.60 (g/mL) G Lab File ID: V5H4892.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/24/2007

% Moisture: not dec. 15 Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

222

5503

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3RS3

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030
Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5
Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-16B
Sample wt/vol: 5.30 (g/mL) G   Lab File ID: V5H4896.D
Level: (TRACE/LOW/MED) LOW   Date Received: 01/24/2007
% Moisture: not dec. 21   Date Analyzed: 01/26/2007
GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0
Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)
Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6.0	U
74-87-3	Chloromethane	6.0	U
75-01-4	Vinyl chloride	6.0	U
74-83-9	Bromomethane	6.0	U
75-00-3	Chloroethane	6.0	U
75-69-4	Trichlorofluoromethane	6.0	U
75-35-4	1,1-Dichloroethene	6.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	6.0	U
67-64-1	Acetone	12	U
75-15-0	Carbon disulfide	6.0	U
79-20-9	Methyl acetate	6.0	U
75-09-2	Methylene chloride	6.0	U
156-60-5	trans-1,2-Dichloroethene	6.0	U
1634-04-4	Methyl tert-butyl ether	6.0	U
75-34-3	1,1-Dichloroethane	6.0	U
156-59-2	cis-1,2-Dichloroethene	6.0	U
78-93-3	2-Butanone	12	U
74-97-5	Bromochloromethane	6.0	U
67-66-3	Chloroform	6.0	U
71-55-6	1,1,1-Trichloroethane	6.0	U
110-82-7	Cyclohexane	6.0	U
56-23-5	Carbon tetrachloride	6.0	U
71-43-2	Benzene	6.0	U
107-06-2	1,2-Dichloroethane	6.0	U
123-91-1	1,4-Dioxane	120	~~U~~ R

223

SS03

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
B3RS3

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-16B

Sample wt/vol: 5.30 (g/mL) G   Lab File ID: V5H4896.D

Level: (TRACE/LOW/MED) LOW   Date Received: 01/24/2007

% Moisture: not dec. 21   Date Analyzed: 01/26/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	6.0	U
108-87-2	Methylcyclohexane	6.0	U
78-87-5	1,2-Dichloropropane	6.0	U
75-27-4	Bromodichloromethane	6.0	U
10061-01-5	cis-1,3-Dichloropropene	6.0	U
108-10-1	4-Methyl-2-pentanone	12	U J
108-88-3	Toluene	6.0	U
10061-02-6	trans-1,3-Dichloropropene	6.0	U
79-00-5	1,1,2-Trichloroethane	6.0	U
127-18-4	Tetrachloroethene	6.0	U
591-78-6	2-Hexanone	12	U J
124-48-1	Dibromochloromethane	6.0	U
106-93-4	1,2-Dibromoethane	6.0	U
108-90-7	Chlorobenzene	6.0	U
100-41-4	Ethylbenzene	6.0	U
179601-23-1	m,p-Xylene	6.0	U
95-47-6	o-Xylene	6.0	U
100-42-5	Styrene	6.0	U
75-25-2	Bromoform	6.0	U
98-82-8	Isopropylbenzene	6.0	U
79-34-5	1,1,2,2-Tetrachloroethane	6.0	U
541-73-1	1,3-Dichlorobenzene	6.0	U
106-46-7	1,4-Dichlorobenzene	6.0	U
95-50-1	1,2-Dichlorobenzene	6.0	U
96-12-8	1,2-Dibromo-3-chloropropane	6.0	U J
120-82-1	1,2,4-Trichlorobenzene	6.0	U
87-61-6	1,2,3-Trichlorobenzene	6.0	U

5503

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3RS3

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-16B

Sample wt/vol: 5.30 (g/mL) G   Lab File ID: V5H4896.D

Level: (TRACE or LOW/MED) LOW   Date Received: 01/24/2007

% Moisture: not dec. 21   Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG   Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

225

 ~~4125~~

S04

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RS5

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-01B

Sample wt/vol: 5.70 (g/mL) G   Lab File ID: V5H4866.D

Level: (TRACE/LOW/MED) LOW   Date Received: 01/23/2007

% Moisture: not dec. 25   Date Analyzed: 01/25/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	5.8	U
74-87-3	Chloromethane	5.8	U
75-01-4	Vinyl chloride	5.8	U
74-83-9	Bromomethane	5.8	U
75-00-3	Chloroethane	5.8	U
75-69-4	Trichlorofluoromethane	5.8	U
75-35-4	1,1-Dichloroethene	5.8	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.8	U
67-64-1	Acetone	12	U
75-15-0	Carbon disulfide	5.8	U
79-20-9	Methyl acetate	5.8	U
75-09-2	Methylene chloride	5.8	U
156-60-5	trans-1,2-Dichloroethene	5.8	U
1634-04-4	Methyl tert-butyl ether	5.8	U
75-34-3	1,1-Dichloroethane	5.8	U
156-59-2	cis-1,2-Dichloroethene	20	
78-93-3	2-Butanone	12	U
74-97-5	Bromochloromethane	5.8	U
67-66-3	Chloroform	5.8	U
71-55-6	1,1,1-Trichloroethane	5.8	U
110-82-7	Cyclohexane	5.8	U
56-23-5	Carbon tetrachloride	5.8	U
71-43-2	Benzene	5.8	U
107-06-2	1,2-Dichloroethane	5.8	U
123-91-1	1,4-Dioxane	120	~~U~~ R

226

S04

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RS5

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-01B

Sample wt/vol: 5.70 (g/mL) G   Lab File ID: V5H4866.D

Level: (TRACE/LOW/MED) LOW   Date Received: 01/23/2007

% Moisture: not dec. 25   Date Analyzed: 01/25/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	860	J
108-87-2	Methylcyclohexane	5.8	U
78-87-5	1,2-Dichloropropane	5.8	U
75-27-4	Bromodichloromethane	5.8	U
10061-01-5	cis-1,3-Dichloropropene	5.8	U
108-10-1	4-Methyl-2-pentanone	12	U
108-88-3	Toluene	5.8	U
10061-02-6	trans-1,3-Dichloropropene	5.8	U
79-00-5	1,1,2-Trichloroethane	5.8	U
127-18-4	Tetrachloroethene	110	
591-78-6	2-Hexanone	12	U
124-48-1	Dibromochloromethane	5.8	U
106-93-4	1,2-Dibromoethane	5.8	U
108-90-7	Chlorobenzene	5.8	U
100-41-4	Ethylbenzene	5.8	U
179601-23-1	m,p-Xylene	5.8	U
95-47-6	o-Xylene	5.8	U
100-42-5	Styrene	5.8	U
75-25-2	Bromoform	5.8	U
98-82-8	Isopropylbenzene	5.8	U
79-34-5	1,1,2,2-Tetrachloroethane	5.8	U
541-73-1	1,3-Dichlorobenzene	5.8	U
106-46-7	1,4-Dichlorobenzene	5.8	U
95-50-1	1,2-Dichlorobenzene	5.8	U
96-12-8	1,2-Dibromo-3-chloropropane	5.8	U
120-82-1	1,2,4-Trichlorobenzene	5.8	U
87-61-6	1,2,3-Trichlorobenzene	5.8	U

227

504

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3RS5

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-01B

Sample wt/vol: 5.70 (g/mL) G   Lab File ID: V5H4866.D

Level: (TRACE or LOW/MED) LOW   Date Received: 01/23/2007

% Moisture: not dec. 25   Date Analyzed: 01/25/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG   Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

228

5504

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RS6

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-02B

Sample wt/vol: 5.50 (g/mL) G   Lab File ID: V5H4867.D

Level: (TRACE/LOW/MED) LOW   Date Received: 01/23/2007

% Moisture: not dec. 28   Date Analyzed: 01/25/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6.3	U
74-87-3	Chloromethane	6.3	U
75-01-4	Vinyl chloride	6.3	U
74-83-9	Bromomethane	6.3	U
75-00-3	Chloroethane	6.3	U
75-69-4	Trichlorofluoromethane	6.3	U
75-35-4	1,1-Dichloroethene	6.3	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	6.3	U
67-64-1	Acetone	13	U
75-15-0	Carbon disulfide	6.3	U
79-20-9	Methyl acetate	6.3	U
75-09-2	Methylene chloride	6.3	U
156-60-5	trans-1,2-Dichloroethene	6.3	U
1634-04-4	Methyl tert-butyl ether	6.3	U
75-34-3	1,1-Dichloroethane	6.3	U
156-59-2	cis-1,2-Dichloroethene	110	
78-93-3	2-Butanone	13	U
74-97-5	Bromochloromethane	6.3	U
67-66-3	Chloroform	6.3	U
71-55-6	1,1,1-Trichloroethane	6.3	U
110-82-7	Cyclohexane	6.3	U
56-23-5	Carbon tetrachloride	6.3	U
71-43-2	Benzene	6.3	U
107-06-2	1,2-Dichloroethane	6.3	U
123-91-1	1,4-Dioxane	130	R

22a

5504

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RS6

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0075-02B

Sample wt/vol: 5.50 (g/mL) G Lab File ID: V5H4867.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/23/2007

% Moisture: not dec. 28 Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	210	
108-87-2	Methylcyclohexane	6.3	U
78-87-5	1,2-Dichloropropane	6.3	U
75-27-4	Bromodichloromethane	6.3	U
10061-01-5	cis-1,3-Dichloropropene	6.3	U
108-10-1	4-Methyl-2-pentanone	13	U
108-88-3	Toluene	6.3	U
10061-02-6	trans-1,3-Dichloropropene	6.3	U
79-00-5	1,1,2-Trichloroethane	6.3	U
127-18-4	Tetrachloroethene	1700* ~~840~~	~~E~~
591-78-6	2-Hexanone	13	U
124-48-1	Dibromochloromethane	6.3	U
106-93-4	1,2-Dibromoethane	6.3	U
108-90-7	Chlorobenzene	6.3	U
100-41-4	Ethylbenzene	6.3	U
179601-23-1	m,p-Xylene	6.3	U
95-47-6	o-Xylene	6.3	U
100-42-5	Styrene	6.3	U
75-25-2	Bromoform	6.3	U
98-82-8	Isopropylbenzene	6.3	U
79-34-5	1,1,2,2-Tetrachloroethane	6.3	U
541-73-1	1,3-Dichlorobenzene	6.3	U
106-46-7	1,4-Dichlorobenzene	6.3	U
95-50-1	1,2-Dichlorobenzene	6.3	U
96-12-8	1,2-Dibromo-3-chloropropane	6.3	U
120-82-1	1,2,4-Trichlorobenzene	6.3	U
87-61-6	1,2,3-Trichlorobenzene	6.3	U

* Transferred from B3RS6ME

230

5504

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3RS6

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-02B

Sample wt/vol: 5.50 (g/mL) G   Lab File ID: V5H4867.D

Level: (TRACE or LOW/MED) LOW   Date Received: 01/23/2007

% Moisture: not dec. 28   Date Analyzed: 01/25/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG   Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

231

505

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RS8

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0075-17B

Sample wt/vol: 5.50 (g/mL) G Lab File ID: V5H4897.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/24/2007

% Moisture: not dec. 34 Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6.9	U
74-87-3	Chloromethane	6.9	U
75-01-4	Vinyl chloride	6.9	U
74-83-9	Bromomethane	6.9	U
75-00-3	Chloroethane	6.9	U
75-69-4	Trichlorofluoromethane	6.9	U
75-35-4	1,1-Dichloroethene	6.9	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	6.9	U
67-64-1	Acetone	14	U
75-15-0	Carbon disulfide	6.9	U
79-20-9	Methyl acetate	6.9	U
75-09-2	Methylene chloride	6.9	U
156-60-5	trans-1,2-Dichloroethene	6.9	U
1634-04-4	Methyl tert-butyl ether	6.9	U
75-34-3	1,1-Dichloroethane	6.9	U
156-59-2	cis-1,2-Dichloroethene	6.9	U
78-93-3	2-Butanone	14	U
74-97-5	Bromochloromethane	6.9	U
67-66-3	Chloroform	6.9	U
71-55-6	1,1,1-Trichloroethane	6.9	U
110-82-7	Cyclohexane	6.9	U
56-23-5	Carbon tetrachloride	6.9	U
71-43-2	Benzene	6.9	U
107-06-2	1,2-Dichloroethane	6.9	U
123-91-1	1,4-Dioxane	140	~~U~~ R

232

505

EPA SAMPLE NO.

B3RS8

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0075-17B

Sample wt/vol: 5.50 (g/mL) G Lab File ID: V5H4897.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/24/2007

% Moisture: not dec. 34 Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	6.9	U
108-87-2	Methylcyclohexane	6.9	U
78-87-5	1,2-Dichloropropane	6.9	U
75-27-4	Bromodichloromethane	6.9	U
10061-01-5	cis-1,3-Dichloropropene	6.9	U
108-10-1	4-Methyl-2-pentanone	14	U J
108-88-3	Toluene	6.9	U
10061-02-6	trans-1,3-Dichloropropene	6.9	U
79-00-5	1,1,2-Trichloroethane	6.9	U
127-18-4	Tetrachloroethene	6.9	U
591-78-6	2-Hexanone	14	U J
124-48-1	Dibromochloromethane	6.9	U
106-93-4	1,2-Dibromoethane	6.9	U
108-90-7	Chlorobenzene	6.9	U
100-41-4	Ethylbenzene	6.9	U
179601-23-1	m,p-Xylene	6.9	U
95-47-6	o-Xylene	6.9	U
100-42-5	Styrene	6.9	U
75-25-2	Bromoform	6.9	U
98-82-8	Isopropylbenzene	6.9	U
79-34-5	1,1,2,2-Tetrachloroethane	6.9	U
541-73-1	1,3-Dichlorobenzene	6.9	U
106-46-7	1,4-Dichlorobenzene	6.9	U
95-50-1	1,2-Dichlorobenzene	6.9	U
96-12-8	1,2-Dibromo-3-chloropropane	6.9	U J
120-82-1	1,2,4-Trichlorobenzene	6.9	U
87-61-6	1,2,3-Trichlorobenzene	6.9	U

233

505

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RS8

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0075-17B

Sample wt/vol: 5.50 (g/mL) G Lab File ID: V5H4897.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/24/2007

% Moisture: not dec. 34 Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

234

5505

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RS9

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0075-18B

Sample wt/vol: 5.60 (g/mL) G Lab File ID: V5H4898.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/24/2007

% Moisture: not dec. 24 Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	5.9	U
74-87-3	Chloromethane	5.9	U
75-01-4	Vinyl chloride	5.9	U
74-83-9	Bromomethane	5.9	U
75-00-3	Chloroethane	5.9	U
75-69-4	Trichlorofluoromethane	5.9	U
75-35-4	1,1-Dichloroethene	5.9	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.9	U
67-64-1	Acetone	12	U
75-15-0	Carbon disulfide	5.9	U
79-20-9	Methyl acetate	5.9	U
75-09-2	Methylene chloride	5.9	U
156-60-5	trans-1,2-Dichloroethene	5.9	U
1634-04-4	Methyl tert-butyl ether	5.9	U
75-34-3	1,1-Dichloroethane	5.9	U
156-59-2	cis-1,2-Dichloroethene	5.9	U
78-93-3	2-Butanone	12	U
74-97-5	Bromochloromethane	5.9	U
67-66-3	Chloroform	5.9	U
71-55-6	1,1,1-Trichloroethane	5.9	U
110-82-7	Cyclohexane	5.9	U
56-23-5	Carbon tetrachloride	5.9	U
71-43-2	Benzene	5.9	U
107-06-2	1,2-Dichloroethane	5.9	U
123-91-1	1,4-Dioxane	120	~~U~~ R

235

5505

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RS9

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-18B

Sample wt/vol: 5.60 (g/mL) G   Lab File ID: V5H4898.D

Level: (TRACE/LOW/MED) LOW   Date Received: 01/24/2007

% Moisture: not dec. 24   Date Analyzed: 01/26/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	3.8	J
108-87-2	Methylcyclohexane	5.9	U
78-87-5	1,2-Dichloropropane	5.9	U
75-27-4	Bromodichloromethane	5.9	U
10061-01-5	cis-1,3-Dichloropropene	5.9	U
108-10-1	4-Methyl-2-pentanone	12	U J
108-88-3	Toluene	5.9	U
10061-02-6	trans-1,3-Dichloropropene	5.9	U
79-00-5	1,1,2-Trichloroethane	5.9	U
127-18-4	Tetrachloroethene	5.9	U
591-78-6	2-Hexanone	12	U J
124-48-1	Dibromochloromethane	5.9	U
106-93-4	1,2-Dibromoethane	5.9	U
108-90-7	Chlorobenzene	5.9	U
100-41-4	Ethylbenzene	5.9	U
179601-23-1	m,p-Xylene	5.9	U
95-47-6	o-Xylene	5.9	U
100-42-5	Styrene	5.9	U
75-25-2	Bromoform	5.9	U
98-82-8	Isopropylbenzene	5.9	U
79-34-5	1,1,2,2-Tetrachloroethane	5.9	U
541-73-1	1,3-Dichlorobenzene	5.9	U
106-46-7	1,4-Dichlorobenzene	5.9	U
95-50-1	1,2-Dichlorobenzene	5.9	U
96-12-8	1,2-Dibromo-3-chloropropane	5.9	U J
120-82-1	1,2,4-Trichlorobenzene	5.9	U
87-61-6	1,2,3-Trichlorobenzene	5.9	U

236

5505

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3RS9

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-18B

Sample wt/vol: 5.60 (g/mL) G   Lab File ID: V5H4898.D

Level: (TRACE or LOW/MED) LOW   Date Received: 01/24/2007

% Moisture: not dec. 24   Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG   Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

237

506

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RT1RE

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0075-19BRA

Sample wt/vol: 4.70 (g/mL) G Lab File ID: V5H4977.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/24/2007

% Moisture: not dec. 28 Date Analyzed: 01/29/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	7.4	U
74-87-3	Chloromethane	7.4	U
75-01-4	Vinyl chloride	7.4	U
74-83-9	Bromomethane	7.4	U
75-00-3	Chloroethane	7.4	U
75-69-4	Trichlorofluoromethane	7.4	U
75-35-4	1,1-Dichloroethene	1.9	J
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	7.4	U
67-64-1	Acetone	15	U
75-15-0	Carbon disulfide	7.4	U
79-20-9	Methyl acetate	7.4	U
75-09-2	Methylene chloride	7.4	U
156-60-5	trans-1,2-Dichloroethene	7.4	U
1634-04-4	Methyl tert-butyl ether	7.4	U
75-34-3	1,1-Dichloroethane	7.4	U
156-59-2	cis-1,2-Dichloroethene	7.4	U
78-93-3	2-Butanone	15	U
74-97-5	Bromochloromethane	7.4	U
67-66-3	Chloroform	7.4	U
71-55-6	1,1,1-Trichloroethane	7.4	U
110-82-7	Cyclohexane	7.4	U
56-23-5	Carbon tetrachloride	7.4	U
71-43-2	Benzene	7.4	U
107-06-2	1,2-Dichloroethane	7.4	U
123-91-1	1,4-Dioxane	150	~~U~~ R

278

506

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RT1RE

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: ____ SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0075-19BRA

Sample wt/vol: 4.70 (g/mL) G Lab File ID: V5H4977.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/24/2007

% Moisture: not dec. 28 Date Analyzed: 01/29/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: ____ (uL) Soil Aliquot Volume: ____ (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	7.4	U
108-87-2	Methylcyclohexane	7.4	U
78-87-5	1,2-Dichloropropane	7.4	U
75-27-4	Bromodichloromethane	7.4	U
10061-01-5	cis-1,3-Dichloropropene	7.4	U
108-10-1	4-Methyl-2-pentanone	15	U
108-88-3	Toluene	7.4	U
061-02-6	trans-1,3-Dichloropropene	7.4	U
79-00-5	1,1,2-Trichloroethane	7.4	U
127-18-4	Tetrachloroethene	7.4	U
591-78-6	2-Hexanone	15	U
124-48-1	Dibromochloromethane	7.4	U
106-93-4	1,2-Dibromoethane	7.4	U
108-90-7	Chlorobenzene	7.4	U
100-41-4	Ethylbenzene	7.4	U
179601-23-1	m,p-Xylene	7.4	U
95-47-6	o-Xylene	7.4	U
100-42-5	Styrene	7.4	U
75-25-2	Bromoform	7.4	U R
98-82-8	Isopropylbenzene	7.4	U
79-34-5	1,1,2,2-Tetrachloroethane	7.4	U
541-73-1	1,3-Dichlorobenzene	7.4	U R
106-46-7	1,4-Dichlorobenzene	7.4	U
95-50-1	1,2-Dichlorobenzene	7.4	U
96-12-8	1,2-Dibromo-3-chloropropane	7.4	U
120-82-1	1,2,4-Trichlorobenzene	7.4	U
87-61-6	1,2,3-Trichlorobenzene	7.4	U

239

~~240~~

~~0194~~

506

EPA SAMPLE NO.

B3RT1RE

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0075-19BRA

Sample wt/vol: 4.70 (g/mL) G Lab File ID: V5H4977.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/24/2007

% Moisture: not dec. 28 Date Analyzed: 01/29/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG Purge Volume: 10.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01	556-67-2	Cyclotetrasiloxane, octamethyl-	10.755	20	NJ
	E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

240

5506

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RT2

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-20B

Sample wt/vol: 4.70 (g/mL) G   Lab File ID: V5H4900.D

Level: (TRACE/LOW/MED) LOW   Date Received: 01/24/2007

% Moisture: not dec. 28   Date Analyzed: 01/26/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	7.4	U
74-87-3	Chloromethane	7.4	U
75-01-4	Vinyl chloride	7.4	U
74-83-9	Bromomethane	7.4	U
75-00-3	Chloroethane	7.4	U
75-69-4	Trichlorofluoromethane	7.4	U
75-35-4	1,1-Dichloroethene	7.4	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	7.4	U
67-64-1	Acetone	15	U
75-15-0	Carbon disulfide	7.4	U
79-20-9	Methyl acetate	7.4	U
75-09-2	Methylene chloride	7.4	U
156-60-5	trans-1,2-Dichloroethene	7.4	U
1634-04-4	Methyl tert-butyl ether	7.4	U
75-34-3	1,1-Dichloroethane	7.4	U
156-59-2	cis-1,2-Dichloroethene	7.4	U
78-93-3	2-Butanone	15	U
74-97-5	Bromochloromethane	7.4	U
67-66-3	Chloroform	7.4	U
71-55-6	1,1,1-Trichloroethane	7.4	U
110-82-7	Cyclohexane	7.4	U
56-23-5	Carbon tetrachloride	7.4	U
71-43-2	Benzene	7.4	U
107-06-2	1,2-Dichloroethane	7.4	U
123-91-1	1,4-Dioxane	150	~~U~~ R

241

~~242~~

SS06

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RT2

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0075-20B

Sample wt/vol: 4.70 (g/mL) G Lab File ID: V5H4900.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/24/2007

% Moisture: not dec. 28 Date Analyzed: 01/26/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	7.4	U
108-87-2	Methylcyclohexane	7.4	U
78-87-5	1,2-Dichloropropane	7.4	U
75-27-4	Bromodichloromethane	7.4	U
10061-01-5	cis-1,3-Dichloropropene	7.4	U
108-10-1	4-Methyl-2-pentanone	15	U J
108-88-3	Toluene	7.4	U
10061-02-6	trans-1,3-Dichloropropene	7.4	U
79-00-5	1,1,2-Trichloroethane	7.4	U
127-18-4	Tetrachloroethene	7.4	U
591-78-6	2-Hexanone	15	U J
124-48-1	Dibromochloromethane	7.4	U
106-93-4	1,2-Dibromoethane	7.4	U
108-90-7	Chlorobenzene	7.4	U
100-41-4	Ethylbenzene	7.4	U
179601-23-1	m,p-Xylene	7.4	U
95-47-6	o-Xylene	7.4	U
100-42-5	Styrene	7.4	U
75-25-2	Bromoform	7.4	U
98-82-8	Isopropylbenzene	7.4	U
79-34-5	1,1,2,2-Tetrachloroethane	7.4	U
541-73-1	1,3-Dichlorobenzene	7.4	U
106-46-7	1,4-Dichlorobenzene	7.4	U
95-50-1	1,2-Dichlorobenzene	7.4	U
96-12-8	1,2-Dibromo-3-chloropropane	7.4	U J
120-82-1	1,2,4-Trichlorobenzene	7.4	U
87-61-6	1,2,3-Trichlorobenzene	7.4	U

242

~~243~~

5506

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3RT2

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-20B

Sample wt/vol: 4.70 (g/mL) G   Lab File ID: V5H4900.D

Level: (TRACE or LOW/MED) LOW   Date Received: 01/24/2007

% Moisture: not dec. 28   Date Analyzed: 01/26/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG   Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

243

~~244~~

507

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RT4

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0075-03B

Sample wt/vol: 6.60 (g/mL) G Lab File ID: V5H4868.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/23/2007

% Moisture: not dec. 11 Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	4.3	U
74-87-3	Chloromethane	4.3	U
75-01-4	Vinyl chloride	4.3	U
74-83-9	Bromomethane	4.3	U
75-00-3	Chloroethane	4.3	U
75-69-4	Trichlorofluoromethane	4.3	U
75-35-4	1,1-Dichloroethene	4.3	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	4.3	U
67-64-1	Acetone	8.5	U
75-15-0	Carbon disulfide	4.3	U
79-20-9	Methyl acetate	4.3	U
75-09-2	Methylene chloride	4.3	U
156-60-5	trans-1,2-Dichloroethene	4.3	U
1634-04-4	Methyl tert-butyl ether	4.3	U
75-34-3	1,1-Dichloroethane	4.3	U
156-59-2	cis-1,2-Dichloroethene	4.3	U
78-93-3	2-Butanone	8.5	U
74-97-5	Bromochloromethane	4.3	U
67-66-3	Chloroform	4.3	U
71-55-6	1,1,1-Trichloroethane	4.3	U
110-82-7	Cyclohexane	4.3	U
56-23-5	Carbon tetrachloride	4.3	U
71-43-2	Benzene	4.3	U
107-06-2	1,2-Dichloroethane	4.3	U
123-91-1	1,4-Dioxane	85	~~U~~ R

244

~~0245~~

S07

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RT4

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-03B

Sample wt/vol: 6.60 (g/mL) G   Lab File ID: V5H4868.D

Level: (TRACE/LOW/MED) LOW   Date Received: 01/23/2007

% Moisture: not dec. 11   Date Analyzed: 01/25/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	4.3	U
108-87-2	Methylcyclohexane	4.3	U
78-87-5	1,2-Dichloropropane	4.3	U
75-27-4	Bromodichloromethane	4.3	U
10061-01-5	cis-1,3-Dichloropropene	4.3	U
108-10-1	4-Methyl-2-pentanone	8.5	U
108-88-3	Toluene	4.3	U
10061-02-6	trans-1,3-Dichloropropene	4.3	U
79-00-5	1,1,2-Trichloroethane	4.3	U
127-18-4	Tetrachloroethene	4.3	U
591-78-6	2-Hexanone	8.5	U
124-48-1	Dibromochloromethane	4.3	U
106-93-4	1,2-Dibromoethane	4.3	U
108-90-7	Chlorobenzene	4.3	U
100-41-4	Ethylbenzene	4.3	U
179601-23-1	m,p-Xylene	4.3	U
95-47-6	o-Xylene	4.3	U
100-42-5	Styrene	4.3	U
75-25-2	Bromoform	4.3	U
98-82-8	Isopropylbenzene	4.3	U
79-34-5	1,1,2,2-Tetrachloroethane	4.3	U
541-73-1	1,3-Dichlorobenzene	4.3	U
106-46-7	1,4-Dichlorobenzene	4.3	U
95-50-1	1,2-Dichlorobenzene	4.3	U
96-12-8	1,2-Dibromo-3-chloropropane	4.3	U
120-82-1	1,2,4-Trichlorobenzene	4.3	U
87-61-6	1,2,3-Trichlorobenzene	4.3	U

245

~~246~~

507

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RT4

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0075-03B

Sample wt/vol: 6.60 (g/mL) G Lab File ID: V5H4868.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/23/2007

% Moisture: not dec. 11 Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

246

~~247~~

SS07

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RT5

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-04B

Sample wt/vol: 5.20 (g/mL) G   Lab File ID: V5H4869.D

Level: (TRACE/LOW/MED) LOW   Date Received: 01/23/2007

% Moisture: not dec. 30   Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6.9	U
74-87-3	Chloromethane	6.9	U
75-01-4	Vinyl chloride	6.9	U
74-83-9	Bromomethane	6.9	U
75-00-3	Chloroethane	6.9	U
75-69-4	Trichlorofluoromethane	6.9	U
75-35-4	1,1-Dichloroethene	4.1	J
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	6.9	U
67-64-1	Acetone	14	U
75-15-0	Carbon disulfide	6.9	U
79-20-9	Methyl acetate	6.9	U
75-09-2	Methylene chloride	6.9	U
156-60-5	trans-1,2-Dichloroethene	6.9	U
1634-04-4	Methyl tert-butyl ether	6.9	U
75-34-3	1,1-Dichloroethane	6.9	U
156-59-2	cis-1,2-Dichloroethene	6.9	U
78-93-3	2-Butanone	14	U
74-97-5	Bromochloromethane	6.9	U
67-66-3	Chloroform	6.9	U
71-55-6	1,1,1-Trichloroethane	6.9	U
110-82-7	Cyclohexane	6.9	U
56-23-5	Carbon tetrachloride	6.9	U
71-43-2	Benzene	6.9	U
107-06-2	1,2-Dichloroethane	6.9	U
123-91-1	1,4-Dioxane	140	~~U~~ R

247

~~248~~

~~1247~~

5507

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RT5

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0075-04B

Sample wt/vol: 5.20 (g/mL) G Lab File ID: V5H4869.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/23/2007

% Moisture: not dec. 30 Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	3.0	J
108-87-2	Methylcyclohexane	6.9	U
78-87-5	1,2-Dichloropropane	6.9	U
75-27-4	Bromodichloromethane	6.9	U
10061-01-5	cis-1,3-Dichloropropene	6.9	U
108-10-1	4-Methyl-2-pentanone	14	U
108-88-3	Toluene	6.9	U
10061-02-6	trans-1,3-Dichloropropene	6.9	U
79-00-5	1,1,2-Trichloroethane	6.9	U
127-18-4	Tetrachloroethene	800 * ~~230~~	~~E~~
591-78-6	2-Hexanone	14	U
124-48-1	Dibromochloromethane	6.9	U
106-93-4	1,2-Dibromoethane	6.9	U
108-90-7	Chlorobenzene	6.9	U
100-41-4	Ethylbenzene	6.9	U
179601-23-1	m,p-Xylene	6.9	U
95-47-6	o-Xylene	6.9	U
100-42-5	Styrene	6.9	U
75-25-2	Bromoform	6.9	U
98-82-8	Isopropylbenzene	6.9	U
79-34-5	1,1,2,2-Tetrachloroethane	6.9	U
541-73-1	1,3-Dichlorobenzene	6.9	U
106-46-7	1,4-Dichlorobenzene	6.9	U
95-50-1	1,2-Dichlorobenzene	6.9	U
96-12-8	1,2-Dibromo-3-chloropropane	6.9	U
120-82-1	1,2,4-Trichlorobenzene	6.9	U
87-61-6	1,2,3-Trichlorobenzene	6.9	U

Transferred from
* B3RT5ME

248

~~0217~~

5507

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RT5

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0075-04B

Sample wt/vol: 5.20 (g/mL) G Lab File ID: V5H4869.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/23/2007

% Moisture: not dec. 30 Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

249

~~250~~

508

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RT7

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0075-05B

Sample wt/vol: 5.30 (g/mL) G Lab File ID: V5H4885.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/23/2007

% Moisture: not dec. 26 Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6.4	U
74-87-3	Chloromethane	6.4	U
75-01-4	Vinyl chloride	6.4	U
74-83-9	Bromomethane	6.4	U
75-00-3	Chloroethane	6.4	U
75-69-4	Trichlorofluoromethane	6.4	U
75-35-4	1,1-Dichloroethene	6.4	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	6.4	U
67-64-1	Acetone	21	
75-15-0	Carbon disulfide	2.3	J
79-20-9	Methyl acetate	6.4	U
75-09-2	Methylene chloride	5.6	J
156-60-5	trans-1,2-Dichloroethene	6.4	U
1634-04-4	Methyl tert-butyl ether	6.4	U
75-34-3	1,1-Dichloroethane	6.4	U
156-59-2	cis-1,2-Dichloroethene	6.4	U
78-93-3	2-Butanone	13	U
74-97-5	Bromochloromethane	6.4	U
67-66-3	Chloroform	6.4	U
71-55-6	1,1,1-Trichloroethane	6.4	U
110-82-7	Cyclohexane	6.4	U
56-23-5	Carbon tetrachloride	6.4	U
71-43-2	Benzene	6.4	U
107-06-2	1,2-Dichloroethane	6.4	U
123-91-1	1,4-Dioxane	130	~~J~~ R

250

505

EPA SAMPLE NO.

B3RT7

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0075-05B

Sample wt/vol: 5.30 (g/mL) G Lab File ID: V5H4885.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/23/2007

% Moisture: not dec. 26 Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	6.4	U
108-87-2	Methylcyclohexane	6.4	U
78-87-5	1,2-Dichloropropane	6.4	U
75-27-4	Bromodichloromethane	6.4	U
10061-01-5	cis-1,3-Dichloropropene	6.4	U
108-10-1	4-Methyl-2-pentanone	13	U
108-88-3	Toluene	2.9	J J
10061-02-6	trans-1,3-Dichloropropene	6.4	U
79-00-5	1,1,2-Trichloroethane	6.4	U
127-18-4	Tetrachloroethene	6.4	U
591-78-6	2-Hexanone	13	U
124-48-1	Dibromochloromethane	6.4	U
106-93-4	1,2-Dibromoethane	6.4	U
108-90-7	Chlorobenzene	6.4	U
100-41-4	Ethylbenzene	6.4	U
179601-23-1	m,p-Xylene	6.4	U
95-47-6	o-Xylene	6.4	U
100-42-5	Styrene	6.4	U
75-25-2	Bromoform	6.4	U R
98-82-8	Isopropylbenzene	6.4	U
79-34-5	1,1,2,2-Tetrachloroethane	6.4	U
541-73-1	1,3-Dichlorobenzene	6.4	U R
106-46-7	1,4-Dichlorobenzene	6.4	U
95-50-1	1,2-Dichlorobenzene	6.4	U
96-12-8	1,2-Dibromo-3-chloropropane	6.4	U
120-82-1	1,2,4-Trichlorobenzene	6.4	U
87-61-6	1,2,3-Trichlorobenzene	6.4	U

251

~~252~~

508

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
B3RT7

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-05B

Sample wt/vol: 5.30 (g/mL) G   Lab File ID: V5H4885.D

Level: (TRACE or LOW/MED) LOW   Date Received: 01/23/2007

% Moisture: not dec. 26   Date Analyzed: 01/25/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG   Purge Volume: 10.0 (mL)

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
01		Unknown-01	2.7	16	J
02		Unknown-02	8.437	13	J
03		Unknown-03	10.748	27	J
04	95-63-6	Benzene, 1,2,4-trimethyl-	10.899	6.7	NJ
05	95-63-6	Benzene, 1,2,4-trimethyl-	11.457	14	NJ
06	526-73-8	Benzene, 1,2,3-trimethyl-	11.956	9.3	NJ
	E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

252

~~253~~

5508

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RT8

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-06B

Sample wt/vol: 5.30 (g/mL) G   Lab File ID: V5H4871.D

Level: (TRACE/LOW/MED) LOW   Date Received: 01/23/2007

% Moisture: not dec. 23   Date Analyzed: 01/25/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6.1	U
74-87-3	Chloromethane	6.1	U
75-01-4	Vinyl chloride	6.1	U
74-83-9	Bromomethane	6.1	U
75-00-3	Chloroethane	6.1	U
75-69-4	Trichlorofluoromethane	6.1	U
75-35-4	1,1-Dichloroethene	6.1	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	6.1	U
67-64-1	Acetone	12	U
75-15-0	Carbon disulfide	6.1	U
79-20-9	Methyl acetate	6.1	U
75-09-2	Methylene chloride	6.1	U
156-60-5	trans-1,2-Dichloroethene	6.1	U
1634-04-4	Methyl tert-butyl ether	6.1	U
75-34-3	1,1-Dichloroethane	6.1	U
156-59-2	cis-1,2-Dichloroethene	5.1	J
78-93-3	2-Butanone	12	U
74-97-5	Bromochloromethane	6.1	U
67-66-3	Chloroform	6.1	U
71-55-6	1,1,1-Trichloroethane	6.1	U
110-82-7	Cyclohexane	6.1	U
56-23-5	Carbon tetrachloride	6.1	U
71-43-2	Benzene	6.1	U
107-06-2	1,2-Dichloroethane	6.1	U
123-91-1	1,4-Dioxane	120	~~U~~ R

253

~~254~~

5508

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RT8

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0075-06B

Sample wt/vol: 5.30 (g/mL) G Lab File ID: V5H4871.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/23/2007

% Moisture: not dec. 23 Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	6.1	U
108-87-2	Methylcyclohexane	6.1	U
78-87-5	1,2-Dichloropropane	6.1	U
75-27-4	Bromodichloromethane	6.1	U
10061-01-5	cis-1,3-Dichloropropene	6.1	U
108-10-1	4-Methyl-2-pentanone	12	U
108-88-3	Toluene	6.1	U
10061-02-6	trans-1,3-Dichloropropene	6.1	U
79-00-5	1,1,2-Trichloroethane	6.1	U
127-18-4	Tetrachloroethene	6.1	U
591-78-6	2-Hexanone	12	U
124-48-1	Dibromochloromethane	6.1	U
106-93-4	1,2-Dibromoethane	6.1	U
108-90-7	Chlorobenzene	6.1	U
100-41-4	Ethylbenzene	6.1	U
179601-23-1	m,p-Xylene	6.1	U
95-47-6	o-Xylene	6.1	U
100-42-5	Styrene	6.1	U
75-25-2	Bromoform	6.1	U
98-82-8	Isopropylbenzene	6.1	U
79-34-5	1,1,2,2-Tetrachloroethane	6.1	U
541-73-1	1,3-Dichlorobenzene	6.1	U
106-46-7	1,4-Dichlorobenzene	6.1	U
95-50-1	1,2-Dichlorobenzene	6.1	U
96-12-8	1,2-Dibromo-3-chloropropane	6.1	U
120-82-1	1,2,4-Trichlorobenzene	6.1	U
87-61-6	1,2,3-Trichlorobenzene	6.1	U

254

~~255~~

5508

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RT8

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0075-06B

Sample wt/vol: 5.30 (g/mL) G Lab File ID: V5H4871.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/23/2007

% Moisture: not dec. 23 Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796 [1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

255

~~256~~

515

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RX9

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0075-07B

Sample wt/vol: 5.90 (g/mL) G Lab File ID: V5H4872.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/23/2007

% Moisture: not dec. 11 Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	4.8	U
74-87-3	Chloromethane	4.8	U
75-01-4	Vinyl chloride	4.8	U
74-83-9	Bromomethane	4.8	U
75-00-3	Chloroethane	4.8	U
75-69-4	Trichlorofluoromethane	4.8	U
75-35-4	1,1-Dichloroethene	4.8	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	4.8	U
67-64-1	Acetone	9.5	U
75-15-0	Carbon disulfide	4.8	U
79-20-9	Methyl acetate	3.5	J
75-09-2	Methylene chloride	4.8	U
156-60-5	trans-1,2-Dichloroethene	4.8	U
1634-04-4	Methyl tert-butyl ether	4.8	U
75-34-3	1,1-Dichloroethane	4.8	U
156-59-2	cis-1,2-Dichloroethene	4.8	U
78-93-3	2-Butanone	9.5	U
74-97-5	Bromochloromethane	4.8	U
67-66-3	Chloroform	4.8	U
71-55-6	1,1,1-Trichloroethane	4.8	U
110-82-7	Cyclohexane	4.8	U
56-23-5	Carbon tetrachloride	4.8	U
71-43-2	Benzene	4.8	U
107-06-2	1,2-Dichloroethane	4.8	U
123-91-1	1,4-Dioxane	95	R

256

515

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RX9

Lab Name: MITKEM CORPORATION | Contract: EP-W-05-030

Lab Code: MITKEM | Case No.: 36113 | Mod. Ref No.: | SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL | Lab Sample ID: F0075-07B

Sample wt/vol: 5.90 (g/mL) G | Lab File ID: V5H4872.D

Level: (TRACE/LOW/MED) LOW | Date Received: 01/23/2007

% Moisture: not dec. 11 | Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm) | Dilution Factor: 1.0

Soil Extract Volume: (uL) | Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	4.8	U
108-87-2	Methylcyclohexane	4.8	U
78-87-5	1,2-Dichloropropane	4.8	U
75-27-4	Bromodichloromethane	4.8	U
10061-01-5	cis-1,3-Dichloropropene	4.8	U
108-10-1	4-Methyl-2-pentanone	9.5	U
108-88-3	Toluene	4.8	U
10061-02-6	trans-1,3-Dichloropropene	4.8	U
79-00-5	1,1,2-Trichloroethane	4.8	U
127-18-4	Tetrachloroethene	4.8	U
591-78-6	2-Hexanone	9.5	U
124-48-1	Dibromochloromethane	4.8	U
106-93-4	1,2-Dibromoethane	4.8	U
108-90-7	Chlorobenzene	4.8	U
100-41-4	Ethylbenzene	4.8	U
179601-23-1	m,p-Xylene	4.8	U
95-47-6	o-Xylene	4.8	U
100-42-5	Styrene	4.8	U
75-25-2	Bromoform	4.8	U
98-82-8	Isopropylbenzene	4.8	U
79-34-5	1,1,2,2-Tetrachloroethane	4.8	U
541-73-1	1,3-Dichlorobenzene	4.8	U
106-46-7	1,4-Dichlorobenzene	4.8	U
95-50-1	1,2-Dichlorobenzene	4.8	U
96-12-8	1,2-Dibromo-3-chloropropane	4.8	U
120-82-1	1,2,4-Trichlorobenzene	4.8	U
87-61-6	1,2,3-Trichlorobenzene	4.8	U

257

~~258~~

515

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RX9

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0075-07B

Sample wt/vol: 5.90 (g/mL) G Lab File ID: V5H4872.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/23/2007

% Moisture: not dec. 11 Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

258

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RY0

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-08B

Sample wt/vol: 6.50 (g/mL) G   Lab File ID: V5H4873.D

Level: (TRACE/LOW/MED) LOW   Date Received: 01/23/2007

% Moisture: not dec. 12   Date Analyzed: 01/25/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	4.4	U
74-87-3	Chloromethane	4.4	U
75-01-4	Vinyl chloride	4.4	U
74-83-9	Bromomethane	4.4	U
75-00-3	Chloroethane	4.4	U
75-69-4	Trichlorofluoromethane	4.4	U
75-35-4	1,1-Dichloroethene	4.4	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	4.4	U
67-64-1	Acetone	8.7	U
75-15-0	Carbon disulfide	4.4	U
79-20-9	Methyl acetate	8.1	
75-09-2	Methylene chloride	4.4	U
156-60-5	trans-1,2-Dichloroethene	4.4	U
1634-04-4	Methyl tert-butyl ether	4.4	U
75-34-3	1,1-Dichloroethane	4.4	U
156-59-2	cis-1,2-Dichloroethene	4.4	U
78-93-3	2-Butanone	8.7	U
74-97-5	Bromochloromethane	4.4	U
67-66-3	Chloroform	4.4	U
71-55-6	1,1,1-Trichloroethane	4.4	U
110-82-7	Cyclohexane	4.4	U
56-23-5	Carbon tetrachloride	4.4	U
71-43-2	Benzene	4.4	U
107-06-2	1,2-Dichloroethane	4.4	U
123-91-1	1,4-Dioxane	87	~~U~~ R

259

~~260~~

516

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RY0

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-08B

Sample wt/vol: 6.50 (g/mL) G   Lab File ID: V5H4873.D

Level: (TRACE/LOW/MED) LOW   Date Received: 01/23/2007

% Moisture: not dec. 12   Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	4.4	U
108-87-2	Methylcyclohexane	4.4	U
78-87-5	1,2-Dichloropropane	4.4	U
75-27-4	Bromodichloromethane	4.4	U
10061-01-5	cis-1,3-Dichloropropene	4.4	U
108-10-1	4-Methyl-2-pentanone	8.7	U
108-88-3	Toluene	4.4	U
10061-02-6	trans-1,3-Dichloropropene	4.4	U
79-00-5	1,1,2-Trichloroethane	4.4	U
127-18-4	Tetrachloroethene	4.4	U
591-78-6	2-Hexanone	8.7	U
124-48-1	Dibromochloromethane	4.4	U
106-93-4	1,2-Dibromoethane	4.4	U
108-90-7	Chlorobenzene	4.4	U
100-41-4	Ethylbenzene	4.4	U
179601-23-1	m,p-Xylene	4.4	U
95-47-6	o-Xylene	4.4	U
100-42-5	Styrene	4.4	U
75-25-2	Bromoform	4.4	U
98-82-8	Isopropylbenzene	4.4	U
79-34-5	1,1,2,2-Tetrachloroethane	4.4	U
541-73-1	1,3-Dichlorobenzene	4.4	U
106-46-7	1,4-Dichlorobenzene	4.4	U
95-50-1	1,2-Dichlorobenzene	4.4	U
96-12-8	1,2-Dibromo-3-chloropropane	4.4	U
120-82-1	1,2,4-Trichlorobenzene	4.4	U
87-61-6	1,2,3-Trichlorobenzene	4.4	U

260

516

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RY0

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-08B

Sample wt/vol: 6.50 (g/mL) G   Lab File ID: V5H4873.D

Level: (TRACE or LOW/MED) LOW   Date Received: 01/23/2007

% Moisture: not dec. 12   Date Analyzed: 01/25/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG   Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796 [1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

261

~~262~~

1A - FORM I VOA-1

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RY1

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-09B

Sample wt/vol: 5.70 (g/mL) G   Lab File ID: V5H4886.D

Level: (TRACE/LOW/MED) LOW   Date Received: 01/23/2007

% Moisture: not dec. 32   Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6.4	U
74-87-3	Chloromethane	6.4	U
75-01-4	Vinyl chloride	6.4	U
74-83-9	Bromomethane	6.4	U
75-00-3	Chloroethane	6.4	U
75-69-4	Trichlorofluoromethane	6.4	U
75-35-4	1,1-Dichloroethene	6.4	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	6.4	U
67-64-1	Acetone	13	U
75-15-0	Carbon disulfide	6.4	U
79-20-9	Methyl acetate	18	
75-09-2	Methylene chloride	6.4	U
156-60-5	trans-1,2-Dichloroethene	6.4	U
1634-04-4	Methyl tert-butyl ether	6.4	U
75-34-3	1,1-Dichloroethane	6.4	U
156-59-2	cis-1,2-Dichloroethene	6.4	U
78-93-3	2-Butanone	65	
74-97-5	Bromochloromethane	6.4	U
67-66-3	Chloroform	6.4	U
71-55-6	1,1,1-Trichloroethane	6.4	U
110-82-7	Cyclohexane	6.4	U
56-23-5	Carbon tetrachloride	6.4	U
71-43-2	Benzene	6.4	U
107-06-2	1,2-Dichloroethane	6.4	U
123-91-1	1,4-Dioxane	130	R

262

~~263~~

1B - FORM I VOA-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B3RY1

Lab Name: MITKEM CORPORATION   Contract: EP-W-05-030

Lab Code: MITKEM   Case No.: 36113   Mod. Ref No.:   SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL   Lab Sample ID: F0075-09B

Sample wt/vol: 5.70 (g/mL) G   Lab File ID: V5H4886.D

Level: (TRACE/LOW/MED) LOW   Date Received: 01/23/2007

% Moisture: not dec. 32   Date Analyzed: 01/25/2007

GC Column: DB-624   ID: 0.25 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 10.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	2.5	J
108-87-2	Methylcyclohexane	6.4	U
78-87-5	1,2-Dichloropropane	6.4	U
75-27-4	Bromodichloromethane	6.4	U
10061-01-5	cis-1,3-Dichloropropene	6.4	U
108-10-1	4-Methyl-2-pentanone	13	U
108-88-3	Toluene	6.4	U
061-02-6	trans-1,3-Dichloropropene	6.4	U
79-00-5	1,1,2-Trichloroethane	6.4	U
127-18-4	Tetrachloroethene	6.4	U
591-78-6	2-Hexanone	13	U
124-48-1	Dibromochloromethane	6.4	U
106-93-4	1,2-Dibromoethane	6.4	U
108-90-7	Chlorobenzene	6.4	U
100-41-4	Ethylbenzene	6.4	U
179601-23-1	m,p-Xylene	6.4	U
95-47-6	o-Xylene	6.4	U
100-42-5	Styrene	6.4	U
75-25-2	Bromoform	6.4	~~U~~ R
98-82-8	Isopropylbenzene	6.4	U
79-34-5	1,1,2,2-Tetrachloroethane	6.4	U
541-73-1	1,3-Dichlorobenzene	6.4	U R
106-46-7	1,4-Dichlorobenzene	6.4	U
95-50-1	1,2-Dichlorobenzene	6.4	U
96-12-8	1,2-Dibromo-3-chloropropane	6.4	U
120-82-1	1,2,4-Trichlorobenzene	6.4	U
87-61-6	1,2,3-Trichlorobenzene	6.4	U

263

~~264~~

S17

1J - FORM I VOA-TIC
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B3RY1

Lab Name: MITKEM CORPORATION Contract: EP-W-05-030

Lab Code: MITKEM Case No.: 36113 Mod. Ref No.: SDG No.: B3RS5

Matrix: (SOIL/SED/WATER) SOIL Lab Sample ID: F0075-09B

Sample wt/vol: 5.70 (g/mL) G Lab File ID: V5H4886.D

Level: (TRACE or LOW/MED) LOW Date Received: 01/23/2007

% Moisture: not dec. 32 Date Analyzed: 01/25/2007

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG Purge Volume: 10.0 (mL)

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
E966796[1]	Total Alkanes	N/A	0	J

[1] EPA-designated Registry Number.

264

~~265~~